



Swimming ability and drowning prevention – Do they have something in common ?

A Nordic case study

Martin Andersson

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<p>Sammandrag:</p> <p>Examensarbetet är en longitudinell undersökning av simkunnighetens och drunkningsstatistikens utveckling i de nordiska länderna 1996-2016. Arbetet behandlar utvecklingen i Finland, Sverige, Danmark och Norge. Materialet utgörs huvudsakligen av simkunnighetsundersökningar och drunkningsstatistik från respektive länder. Därtill har vetenskapliga artiklar om simkunnighet och drunkningsprevention styrkt materialet. Den teoretiska grunden vilar på världsomfattande dokument på det drunkningspreventiva arbetets område. Av dessa kan nämnas WHO:s - Global Report on Drowning från 2014 och International Life Saving Federations - Drowning Prevention Strategies från 2015. Min avsikt har varit att kunna påvisa ett samband mellan en förbättrad simkunnighet följt av en nedgång i det årliga antalet fatala drunkningsolyckor i de undersökta länderna. Det är sedan länge känt att flera faktorer påverkar risken för att råka ut för en fatal, drunkningsolycka. Av dessa kan nämnas ålder, kön, etniskt ursprung, sjukdom och andra faktorer. Bland de andra faktorerna finner vi bruk av alkohol då man simmar, fiskar eller åker båt, försummelse att använda flytväst samt simkunnighet. En nations simkunnighet ser ut att spela en tydlig drunkningspreventiv roll. En ökad simkunnighet leder till ett lägre antal årliga, fatala drunkningsolyckor. Resultaten i detta arbete styrker detta påstående. De undersökta ländernas simkunnighet har ökat och antalen årliga, fatala drunkningsolyckor minskat under den undersökta tidsperioden. Drunkningsolyckorna i de nordiska länderna präglas starkt av alkohol och av försummelse att använda flytväst på sjön. Män är starkt överrepresenterade i alla åldersgrupper i alla länder. Detta minskar trots allt inte simkunnighetens roll i det drunkningspreventiva arbetet. De nordiska samarbetet inom drunkningsprevention är unikt och har skapat fantastiska resultat. Den Nordiska definitionen av simkunnighet från 1996 som har varit en hörnsten i detta arbete har haft en betydande roll i att öka simkunnigheten i de Nordiska länderna. Då det fortfarande saknas en globalt accepterad definition av simkunnighet och livräddningsfärdigheter kan det Nordiska samarbetet utgöra en utmärkt modell för resten av världen.</p>	
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<p>Abstract:</p> <p>This thesis is a longitudinal research of swimming ability and the drowning statistics in the Nordic countries 1996-2016. The thesis studies Finland, Sweden, Denmark and Norway. The material consists mainly of swimming ability research and drowning statistics from the respective countries. Scientific articles on swimming ability and drowning prevention have been used as additional material. The theoretical foundation rests on global drowning prevention documents such as the WHO – Global Report on Drowning from 2014 and the International Life Saving Federation's – Drowning Prevention Strategies from 2015. My goal has been to find a correlation between an improved swimming ability followed by a decrease in the amount of annual, fatal, unintentional drowning incidents in the researched countries. Several variables affect the risk of suffering a fatal drowning incident. These are e.g. age, gender, ethnic background, illness and other factors. Among the other factors we find alcohol, negligence to use personal floatation devices and swimming ability. A nation's swimming ability clearly has a drowning preventive effect. An improvement in swimming ability leads to less annual, fatal, unintentional drowning incidents. The results from this thesis strengthens this claim. The swimming ability in the researched countries has improved and the annual drowning rates decreased. Alcohol and not wearing personal floatation devices are contributing factors in a large part of the Nordic drowning incidents. Men are vastly overrepresented in all age groups. Improving the swimming ability of a nation is a strong drowning preventive measure. The Nordic cooperation in drowning prevention has produced good results. The Nordic definition of swimming ability from 1996 has had a significant effect on the swimming ability of the Nordic nations. As there is no globally accepted definition on swimming ability and self-rescue skills the Nordic cooperation could function as a role model on global scale.</p>	
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<p>Tiivistelmä:</p> <p>Opinnäytetyö on pitkittäistutkimus uimataidon ja hukkumistilastojen kehittymisestä Pohjoismaissa vuosina 1996-2016. Tutkitut maat ovat Suomi, Ruotsi, Tanska ja Norja. Materiaali koostuu pääasiassa uimataitotutkimuksista ja hukkumistilastoista kustakin maasta. Tämän lisäksi työlle luovat pohjaa useat tieteelliset tutkimukset uimataidon kehittämisestä ja opettamisesta sekä hukkumisten vastaisesta työstä. Teoreettisena perustana toimii maailmanlaajuisia hukkumisten vastaista työtä ohjaavat dokumentit. Näistä tärkeimpinä WHO:n – Global Report on Drowning Prevention vuodelta 2014 sekä International Life Saving Federation – Drowning Prevention Strategies vuodelta 2015. Tavoitteenani on ollut näyttää toteen korrelaatio parantuneen uimataidon ja laskevien vuosittaisten, kuolemaan johtavien, tapaturmaisten hukkumistapausten välillä. Jo nyt tiedetään että useat tekijät vaikuttavat riskiin joutua kuolemaan johtavan hukkumistapaturman uhriksi. Näitä ovat esim. ikä, sukupuoli, etninen tausta, fyysisen sairaus sekä muut tekijät. Muita tekijöitä ovat alkoholi, pelastusliivien käyttämättä jättäminen sekä uimataito. Uimataidolla on selkeä hukkumisia torjuva vaikutus. On väitetty että parantunut uimataito vähentää vuosittaisia, kuolemaan johtavia hukkumistapauksia. Tämän työn tulokset vahvistavat tätä käsitystä. Tässä työssä tutkittujen Pohjoismaiden uimataito on parantunut ja vuosittaiset, kuolemaan johtaneet, tapaturmaiset hukkumistapaukset ovat vähentyneet. Tapaturmaisissa, kuolemaan johtaneissa hukkumistapauksissa Pohjoismaissa alkoholi ja käyttämättä jätetyt pelastusliivit ovat vahvoja osatekijöitä. Tämä ei kuitenkaan vähennä hyvän uimataidon merkitystä hukkumisia ennaltaehkäisevässä työssä. Pohjoismainen yhteistyö hukkumisia ennaltaehkäisevässä työssä on ainutlaatuinen ja on saanut merkittäviä tuloksia aikaan. Pohjoismaisella uimataidon määritelmällä vuodelta 1996 on ollut merkittävä rooli parantuneessa uimataidossa Pohjoismaissa viimeisen kahdenkymmenen vuoden aikana. Toistaiseksi ei ole olemassa koko maailman kattavaa uimataidon ja hengenpelastustaitojen määritelmää. Pohjoismainen yhteistyö voi tässä toimia loistavana esimerkkinä ja suunnannäyttäjänä koko maailmalle.</p>	
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CONTENTS

1	Introduction.....	10
2	Background.....	11
2.1	Drowning – a global perspective	11
2.2	Drowning prevention through the ILS and ILSE	12
2.3	Drowning prevention in the Nordic countries	13
2.3.1	<i>Swimming ability cooperation.....</i>	<i>13</i>
2.3.2	<i>Nordic drowning prevention cooperation.....</i>	<i>15</i>
2.4	Drowning statistics.....	15
2.4.1	<i>Data quality, completeness and comprehensiveness</i>	<i>16</i>
2.4.2	<i>Collecting drowning data</i>	<i>16</i>
2.4.3	<i>Collecting drowning data – an optimum</i>	<i>17</i>
2.5	Drowning risk factors	18
2.5.1	<i>Gender as a risk factor</i>	<i>18</i>
2.5.2	<i>Age as a risk factor.....</i>	<i>19</i>
2.5.3	<i>Ethnicity as a risk factor.....</i>	<i>21</i>
2.5.4	<i>Medical conditions as a risk factor</i>	<i>23</i>
2.5.5	<i>Other risk factors</i>	<i>24</i>
2.6	Drowning prevention.....	25
2.6.1	<i>Adapted drowning preventive measures</i>	<i>26</i>
2.6.2	<i>Infants and toddlers.....</i>	<i>27</i>
2.6.3	<i>Children and young adolescents</i>	<i>29</i>
2.6.4	<i>Teenagers and young adults.....</i>	<i>32</i>
2.6.5	<i>Adults and older adults.....</i>	<i>34</i>
2.7	Drowning preventive measures and actions	36
2.7.1	<i>Primary measures</i>	<i>37</i>
2.7.2	<i>Secondary measures.....</i>	<i>37</i>
2.7.3	<i>Tertiary measures.....</i>	<i>37</i>
2.7.4	<i>WHO – ten drowning preventive actions on three levels</i>	<i>38</i>
3	Objectives and research questions.....	38
3.1	Theoretical frame of reference	39
3.2	Key words and concepts	39
4	Method.....	40
4.1	A longitudinal study	40
4.2	Data collection method	41
4.3	Data analysis and interpretation.....	43

4.4	Research ethics evaluation	43
5	Results	44
5.1	Nordic drowning statistics.....	44
5.1.1	<i>Drowning statistics Finland.....</i>	<i>44</i>
5.1.2	<i>Drowning statistics Sweden</i>	<i>48</i>
5.1.3	<i>Drowning statistics Denmark.....</i>	<i>51</i>
5.1.4	<i>Drowning statistics Norway</i>	<i>54</i>
5.1.5	<i>A typical Nordic drowning incident</i>	<i>57</i>
5.1.6	<i>Nordic drowning incidents – gender and age.....</i>	<i>58</i>
5.1.7	<i>Nordic drowning incidents – ethnicity</i>	<i>59</i>
5.1.8	<i>Nordic drowning incidents – other risk factors.....</i>	<i>60</i>
5.2	Nordic swimming ability research.....	62
5.3	Swimming ability research in Finland.....	63
5.3.1	<i>Swimming ability among adults in Finland</i>	<i>64</i>
5.3.2	<i>Swimming ability among children in Finland</i>	<i>66</i>
5.4	Swimming ability research in Sweden.....	69
5.4.1	<i>Swimming ability among children in Sweden</i>	<i>70</i>
5.4.2	<i>Swimming ability among adults in Sweden</i>	<i>73</i>
5.5	Swimming ability research in Denmark	74
5.5.1	<i>Swimming ability among adults in Demark 2007</i>	<i>75</i>
5.5.2	<i>Swimming ability among children in Demark 2007</i>	<i>76</i>
5.5.3	<i>Swimming ability among adults in Demark 2014</i>	<i>77</i>
5.5.4	<i>Swimming ability among children in Demark 2014</i>	<i>80</i>
5.6	Swimming ability research in Norway.....	82
5.6.1	<i>Swimming ability among children in Norway.....</i>	<i>83</i>
5.7	Collecting Nordic drowning and swimming ability data	89
5.7.1	<i>Collecting drowning data</i>	<i>89</i>
5.7.2	<i>Collecting swimming ability data</i>	<i>90</i>
6	Discussion	91
6.1	Swimming ability and drowning prevention	92
6.1.1	<i>Nordic swimming ability and drowning rates 1996-2016.....</i>	<i>92</i>
6.1.2	<i>Data collection instruments and data quality.....</i>	<i>95</i>
6.1.3	<i>An improved swimming ability implies fewer drownings</i>	<i>98</i>
6.1.4	<i>Swimming ability and drowning rates correlate.....</i>	<i>99</i>
6.2	Thesis evaluation.....	100
6.2.1	<i>Collecting material.....</i>	<i>101</i>
6.2.2	<i>Drawing conclusions.....</i>	<i>101</i>
6.2.3	<i>Future research</i>	<i>102</i>

References	103
Swedish summary / svenskspråkigt sammandrag.....	110

Figures

Figure 1. Long term drowning statistics Finland (Suomen Uimaopetus- ja Hengenpelastusliitto 2016c).....	47
Figure 2. Drownings children under 19 years of age in Sweden 1970-2015 (Svenska Livräddningssällskapet 2015 p. 4).....	49
Figure 3. Long term drowning statistics in Sweden per 100 000 population (Svenska Livräddningssällskapet 2013 p. 1).....	51
Figure 4. Long term drowning statistics in Denmark, blue colored line = unintentional drownings (Moller et al. 2011 p. 48).....	53
Figure 5. Drowning rate in Denmark 2001-2009 per 100 000 population/age groups (Moller et al. 2011 p.49).....	54
Figure 6. Amount of unintentional, fatal drowning incidents in the Nordic countries 1996-2016 (Numbers based on official drowning statistics published by: Trygfonden, SUH, SLS and SSB).....	57
Figure 7. Swimming ability in the Nordic countries 1996-2016 – adults.....	87
Figure 8. Swimming ability in the Nordic countries 1996-2016 – children.....	88

FOREWORD

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1 INTRODUCTION

This thesis is a longitudinal study of swimming ability and drowning rates in the Nordic countries. The thesis studies Finland, Sweden, Denmark and Norway. The time period investigated is 1996 to 2016. In 1996 the Nordic countries defined the term swimming ability. According to the Nordic definition of swimming ability one is able to swim when one, after being immersed in water, can swim continuously for 200 meters, of which at least 50 meters on backstroke (Suomen Uimaopetus- ja Hengenpelastusliitto 2011 p. 9). This definition has been used in the Nordic countries since 1996 when testing if a person can be considered able to swim. This is also the definition of swimming ability in this thesis unless otherwise stated. Drowning is one of the leading killers in the world claiming more than 370.000 lives each year. Drowning is also a leading killer among children and young adults. The WHO has called drowning a preventable but neglected issue in relative to its impact on families, communities and livelihoods (World Health Organization 2014 p. 40). Drowning rates are particularly high in low- and middle income countries. Over 90 % of all deaths by drowning occur in these countries. Unlike other global killers like malaria, and malnutrition there are no broad prevention efforts that specifically target drowning.

High-income countries like the Nordic countries have reduced their drowning rates continuously since the mid-20th century. For example in Sweden approximately 1000 people drowned per year in the beginning of the 20th century. In the 1940s there was a substantial effort to reduce drowning rates in Sweden by teaching the population to swim. This led to a reduction in the drowning rates by 50 %. By the 1960s the numbers had dropped to under 350 drownings a year, a positive development that is still in progress. Today there is approximately 100 fatal, unintentional drowning incidents per year in Sweden (Svenska Livräddningssällskapet 2016e). Some of the strategies used for reducing the drowning rates in high-income countries have been successfully adapted in low-and middle income countries. One of the strategies is to teach school-age children basic swimming, water safety and safe rescue skills. (World Health Organization 2014 p. vii-ix) A large part of the world is still struggling with defining swimming ability and self-rescue skills. The unique co-operation between the Nordic countries on these issues could function as a role model for the rest of the world.

In 1996 the Nordic countries agreed on a definition of the term swimming ability (see above). Since then the Nordic countries have been collecting data on swimming ability creating national swimming ability statistics. Drowning data has been collected in the Nordic countries for decades. Many studies have been made concerning drowning statistics and the reasons behind drowning incidents. In 2013 a World Congress on Drowning Prevention was held. During this congress current statistics on Nordic swimming ability was presented as well as information on the Nordic drowning prevention cooperation. The methods and the regularity for collecting swimming ability and drowning statistics has varied in the Nordic countries. This thesis strives to gather all published, relevant information on swimming ability and drowning statistics in the Nordic countries from 1996 to 2016. The thesis also includes long term drowning statistics from the beginning and middle of the 20th century. However this information is superficial and only included to reveal the long term development of drowning statistics in the Nordic countries. This is the first study of swimming ability in a Nordic context that strives to map out the development of swimming ability in the Nordic countries and reveal a correlation between an improved swimming ability followed by a decrease in the drowning rates. The initiative to this thesis came from the Finnish Swimming Teaching and Lifesaving Federation or Suomen Uimaopetus- ja Hengenpelastusliitto ry. However this thesis would not have been possible without the help and cooperation of numerous Nordic swimming and lifesaving experts.

2 BACKGROUND

2.1 Drowning – a global perspective

Drowning is a global killer, claiming more than 370.000 lives each year. This number is most likely even higher due to problems with collecting reliable statistics on drowning rates especially in developing countries. So what is considered to be a death by drowning? According to the International Life Saving Federation (ILS) drowning is “the process of experiencing respiratory impairment from submersion/immersion in liquid” (International Life Saving Federation 2015 p. 10). If this impairment leads to death, the person has drowned. This definition was adopted at the first World Congress on Drowning in

Amsterdam 2002. A global definition was needed in order to help with registration, diagnosis and research on drowning. (International Life Saving Federation 2002 p. 1) Even if we accept the fact that drowning statistics are not reliable and most likely underreported the WHO identifies drowning as the third largest cause of unintentional death in the world. The WHO has estimated that in the year of 2000 almost 410.000 human beings died in drowning incidents. The ILS has estimated in 2007 that the health information systems in the developing countries in most cases are unable to register a death caused by drowning. Another estimate is that at least nine out of ten people who drown globally are citizens of developing countries. A sad fact is that most of these drowning victims are children under 18 years of age and the largest number is made up of children under five. Accordingly it is no exaggeration to say that drowning is a health epidemic on a global scale. (International Life Saving Federation 2015 p. 10) In 2014 the WHO published the WHO Global Drowning Report. This report emphasized the importance of preventive work to reduce drowning rates. This is because most drowning incidents lead to death. Survival depends on two highly variable factors 1) how quickly the drowning victim is removed from the water 2) how quickly proper resuscitation is performed on the victim. Preventive measures are therefore very important. (World Health Organization 2014 p. viii) An alarming fact is that if we look at the ten most common causes of death among children and young adults, drowning is among them in every region of the world. Children under five are the most likely to die from drowning and males twice as likely as females.

2.2 Drowning prevention through the ILS and ILSE

The ILS was founded through the merger of The International Lifesaving Federation (FIS) and The World Life Saving (WLS) in 1993. The ILS is the international federation for Lifesaving and Lifesaving Sport. The ILS is the world authority in global drowning prevention. The ILS is a non-profit organization of aquatic lifesavers and aquatic lifesaving organizations. The ILS works towards strategic goals through a close cooperation between its member federations. The ILS helps to establish lifesaving organizations in areas of the world where it is needed. The ILS works in close contact with national and international organizations committed to drowning prevention, aquatic safety, emergency

response and sport. e.g. the WHO, the International Red Cross and Red Crescent Organization (IRC), the International Council of Sports Science and Physical Education (ICS-SPE) and many more. (International Life Saving Federation 2010 p. 3, 12 and 28)

ILSE or The International Lifesaving Federation of Europe is the European branch of the ILS. ILSE represents organizations working in the field of water safety in Europe. ILSE works towards the same strategic goals as the ILS in making a global effort to reduce injury and death in and around water. ILSE helps establish lifesaving federations in Europe and acts as the European federation for lifesaving sport. (International Life Saving Federation of Europe 2016)

2.3 Drowning prevention in the Nordic countries

The NLF or the Nordic Lifesaving Federation was founded in 1945 in Stockholm, Sweden. The initial founders were the national lifesaving federations of Finland, Sweden, Denmark and Norway. Iceland joined NLF in 1970. The NLF changed its name in 2012 to the Nordic Lifesaving Group. The Nordic Lifesaving Group has yearly meetings every fall and the organizing duties rotate among the member federations. The Nordic Lifesaving Group has no secretary, staff, bureaucracy, budget or voting procedure. The Nordic Lifesaving Group is the only regional group within ILSE. The Nordic cooperation consists of working together on issues like swimming ability, drowning prevention, drownings statistics, sharing best practice, protecting immaterial rights and international issues. (International Life Saving Federation of Europe 2016)

2.3.1 Swimming ability cooperation

In 1996 the Nordic lifesaving federations reached an agreement on a Nordic definition of swimming ability (see p. 10). The Nordic definition of swimming ability was sent to ILSE for approval. There has also been talk of having this definition approved by the ILS in the future. To this day there is no globally approved definition of swimming ability. (International Life Saving Federation of Europe 2016)

All Nordic national and local level school curriculums include swimming education. There are however some differences in what each country emphasizes in the swimming education. The Nordic definition of swimming ability has been challenged during the last twenty years despite the agreement in 1996. In Norway the approach to swimming ability within the school system has been slightly different than in the other Nordic countries. Norway has had a wider view on teaching and training aquatic skills. There has been more focus on learning to swim in demanding conditions e.g. in cold water and on learning essential aquatic skills like controlled breathing, floating, diving etc. In 2013 a study called “Can you swim in waves? Children’s swimming, floating and entry skills in calm and simulated unsteady water”, was launched. (Kjendlie et al. 2013b) It was part of a larger international study called Can you swim? (Moran et al. 2012).

The Can you swim in waves? – study revealed an 8 % decrement on average (time elapsed) in performance during a 200 meter swim in calm versus unsteady water. During the first 50 meters the performance decrement (time elapsed) was 14 %. The immediate stress, shock factor when being forced to swim in unsteady water seems to lead to a higher performance decrement initially. The 200 meter swimming test was performed by 66, 11-year old, Norwegian children, on two occasions. Twenty percent of the children did not manage to complete the 200 meter test in calm water and 40 % did not in unsteady water. The researchers also tested how unsteady water affected a rolling entry, a diving entry and floating. The performance decrement for the rolling entry into unsteady water was 21 % on average, 16 % for the diving entry and 24 % in a three minute floating test. Both test occasions were arranged in a 25 meter, 27 degrees centigrade, indoor pool. There were large individual differences in how the unsteady water affected the swimmer. (Kjendlie et al. 2013b p. 301-303)

Norwegian drowning statistics from 1998 to 2010 have shown that 93 % of all fatal drowning accidents happen outdoors in surf water e.g. in the sea, in a lake or in a river. Only 7 % of all drownings happen while swimming or bathing in a pool or at the beach. The researchers were worried about the fact that most children learn basic aquatic skills in indoor pools, in warm and calm water. Most children end their swimming education or training after primary school. In other words skills are to a large extent learnt in calm, warm water during a few short years. There is little evidence that aquatic skills learnt in

calm water actually transfer to unsteady water. The researchers wanted to find out if aquatic skills learnt indoors can prepare Norwegian children to face the risks in real, outdoor conditions. They also wanted to find out whether indoor swimming instruction has significant protective value for swimming in unsteady water. Learning to float in unsteady water is very important. Learning this skill properly could make a major contribution to survival in a drowning incident. Water entry skills are equally important for self-rescue and they should be an integral part of the aquatic skills taught. In a drowning incident you must be able to get into the water in a controlled fashion and be able to reorient your body in a good breathing position. The researchers concluded that the performance decrements seen in these tests are expected to be a lot bigger in cold, unsteady water. All learn-to-swim programs should include open water exercises, games and simulation. If possible actual open water experiences should also be a part of the swimming education. The focus should then be on learning and acquiring necessary survival skills in open water conditions. (Kjendlie et al. 2013b p. 311-312)

2.3.2 Nordic drowning prevention cooperation

Drowning prevention cooperation between the Nordic countries consists of sharing best practice for information, events, education, advertising and methods. The drowning statistics for the Nordic countries share many characteristics. A typical drowning victim is a middle aged man under the influence of alcohol. Many drowning incidents happen during boating or fishing under the influence of alcohol. Not wearing a lifejacket is also all too common. (International Life Saving Federation of Europe 2016)

2.4 Drowning statistics

Drowning statistics are problematic in many ways. The developing countries have big difficulties collecting reliable data on drownings. Some countries have no system in place at all for collecting drowning data. Even developed high-income countries like the Nordic countries face certain difficulties in collecting reliable drowning data. The ILS has been aware of the problems concerning data collection for a long time. In 2007 the ILS released the very first ILS World Drowning Report. This report painted a picture of the size and scale of the drowning problem. The conclusion was that the existing global and regional

drowning estimates were limited and that further research about key issues and interventions was needed. In 2011 the ILS conducted the ILS Drowning Data and Research Survey among its member states in order to identify reasons behind difficulties in collecting drowning data. The ILS wanted to get a more complete understanding of drowning on a national level and how the member states use their drownings statistics to create preventive measures. (International Life Saving Federation 2012 p. 4) The ILS wanted to know what kind of data and how data is collected as well as how it is used and how it affects decisions about preventive measures. In their report from 2012 the ILS pinpoints three dimensions concerning drowning data: data quality, data completeness and data comprehensiveness.

2.4.1 Data quality, completeness and comprehensiveness

Data quality means the degree to which the drowning data can be considered reliable or trusted. Indicators on data quality are the strength of the collecting methods, the source of data and consistency with other reports. Data completeness stands for the degree to which the data covers all drowning deaths and provides enough information on specific sections. Indicators on data completeness are that it covers all key age groups, provides data for both genders and enables both national and regional analyses. Data comprehensiveness equals the degree to which data can be analyzed against key variables and thus used for making decisions on preventive measures. Indicators on data comprehensiveness are data that provide information on location of the drowning incident, data on activity prior to the incident, data on other variables or risk factors such as influence of alcohol or drugs, pool fences and the use of lifejackets etc. (International Life Saving Federation 2012 p. 16-17)

2.4.2 Collecting drowning data

The ILS Drowning Data and Research Survey Report (2012 p. 17) reveals that drowning data is being collected in the ILS member states by many different organizations. These include lifesaving agencies, government agencies, other organizations and in some cases private actors. The upside of having many collectors is that it allows for the collection and thus validation of data from multiple sources. It also gives a better completeness of

data on both national and regional level compared to countries that only use one source for collecting drowning data. Downsides with having many collectors are issues with consistency of coding and the quality of data. One data source with consistent coding usually means consistent data over time that can be combined and compared to increase validation. A common problem concerning ILS drowning statistics is that some countries include intentional deaths by drowning, when some choose to exclude them. Other problems come from duplication or replication of drowning data in the member states. Needless to say that unreliable data might lead to wrong decisions concerning drowning prevention measures and a waste of limited drowning prevention resources. Therefore accurate and reliable drowning data is of utmost importance.

2.4.3 Collecting drowning data – an optimum

The best case scenario for collecting drowning data according to the ILS Drowning Data and Research Survey Report (2012 p. 17) would include multiple ways to collect data to ensure that all drowning incidents are caught and analyzed. In an ideal world local, grass root level, key actors would have sufficient resources and processes in place to ensure that all drowning incidents are collected and coded. Data collection could then be done in a way to ensure that no essential information regarding drowning incidents is lost. This of course is rarely the case even in high-income countries and almost never in low- and middle-income countries. It is very important to collect information about the age of the drowning victims as well as information about gender. It is common that ILS member states have specific age groups within the drowning statistics for small children and young adults but not for adults. Many countries do not have proper age groups for adults. This might reflect a bigger interest in or focus on child drownings. This in turn reflects the high social, emotional and economic costs of drownings. A cost that is higher the younger the drowning victim is.

A drowning incident that leads to death is always a shocking and tragic loss. The victim can be a child, a mother, a father and so on. Natural disasters like floods or tsunamis can claim entire communities at once. The economic cost of a drowning is high. Though difficult to calculate exactly some estimates have been made. According to the WHO Global Report on Drowning (World Health Organization 2014 p. 10) National-level estimates

for Australia, Canada and the United States of America range from 85 million US\$ to 4.1 billion US\$ annually. The younger the victim the bigger the loss and cost over time.

It is also very important to know where the drowning incident happened. In other words drowning data should always include the location of the incident. Another important fact is what activity preceded the drowning incident. The location tells us who has access and ownership and what types of activities might take place there. This of course is important to know when designing drowning prevention strategies. Knowing what activity the drowning victim was engaged in before the incident gives us, in combination with the location, a definition of the user of the location e.g. swimming, fishing and so on. Unfortunately it is not uncommon that drowning incidents do not have any witnesses. The ILS admits that further work needs to be done to develop proper categories both for location and activity to help countries collect reliable, comprehensive drowning data. (International Life Saving Federation 2012 p. 17-18)

2.5 Drowning risk factors

According to the International Lifesaving Federation - Drowning Prevention Strategy (International Life Saving Federation 2015 p. 12) factors that contribute to a drowning incident are: gender, age, supervision, ethnicity and medical conditions.

2.5.1 Gender as a risk factor

Males are twice as likely to drown as females, this is true on a global scale. Evidence supporting this can be found in the World Health Organization - Global Report on Drowning (WHO 2014) as well as in all the drowning statistics for the Nordic countries covering the timeline for this thesis 1996-2016. The WHO – UNICEF World report on child injury prevention reveals that boys are overrepresented in the drowning statistics in every region of the world. The overall drowning rate for boys under 20 years of age in 2004 was 9.0 per 100 000 population compared to 5.2 for girls. (World Health Organization 2008 p. 61) Males have a different risk taking behavior than females. Males take bigger risks by nature throughout their lives. Males also have a tendency to overestimate their own abilities, this is also true for swimming ability and self-rescue skills. Moran et al. (2012 p. 2-

3) found that males overestimate their water competencies e.g. swimming ability and underestimate the risk of drowning i.e. they overestimate their ability to manage risky situations. It is not uncommon for boys and young men to swim or play in deeper waters and further from the shore than they really should considering their actual swimming ability. This combined with the fact that the ability to save oneself let alone somebody else is often overestimated, can lead to disastrous results. Other common misconceptions are how fast a person actually can drown, disappears below the surface or how incredibly hard it can be to find a person who has been submerged. It is ironic that the drowning victim is often found on the bottom very close to the place he or she went under. This reveals the very difficult circumstances surrounding many drowning incidents. Waves, currents, strong winds, poor visibility in the water etc. can make a rescue close to impossible. If you are not a strong swimmer your chance to save somebody from drowning is very limited. This combined with panic and fear does not raise the odds for a successful rescue. A Swedish survey covering the years 1998-2007 by the government agency MSB or Myndigheten för samhällsskydd och beredskap investigated why children aged between 0-17 drown in Sweden? (Myndigheten för samhällsskydd och beredskap 2010) This survey revealed that in a substantial amount of the fatal drowning incidents involving children aged 0-17, the victims were surrounded by or in the company of other children, swimming or playing. However nobody saw the victim go under or they realized the victim was missing when it was too late. Another common scenario was that the victim was seen going under but he or she could not be found or the others were too weak to make a rescue. The drowning victim was often found near the place of submersion by divers. (Myndigheten för samhällsskydd och beredskap 2010 p. 12)

2.5.2 Age as a risk factor

So how does age affect the risk of drowning? The highest rates globally for drowning are among children aged 1-4, the second highest among children aged 5-9. The Western Pacific Region has the highest drowning rates. Fatal drowning incidents with children aged 5-14 outnumber any other cause of death in this region. (World Health Organization 2014 p. 9) According to the WHO 50 % of all drowning victims in the world annually, are under 25 years of age. (World Health Organization 2014 p. viii) According to the WHO – UNICEF World report on child injury prevention the overall, global drowning rate for

children was 7.2 per 100 000 population in 2008. The regional differences in the drowning rates are large. A comparison of low- and middle income to high-income countries reveals a drowning rate six times higher in the low- and middle countries (7.8 compared to 1.2 per 100 000). (World Health Organization 2008 p. 59) The Swedish survey by the MSB (see above) showed that even though the numbers are very modest in a global comparison drowning is the most common cause of death among children aged 0-6 years and the second most common cause of death among children aged 0-17 years in Sweden. During the years 1998-2007, 93 children aged 0-17 drowned in Sweden. The majority were boys and 60 % of them 0-6 years of age. Under 10 fatal drowning incidents per year is a very modest number and a result of decades of persistent drowning preventive work. A study launched by the Safety Investigation Authority or Onnettomuustutkintakeskus in Finland collected information on accidental deaths among 0-17 year old children during a three year time period from 2009 to 2011. During this time period 199 children died accidentally. Drowning was the second most common, accidental cause of death. There were 17 fatal drowning incidents among 0-17 year old children between 2009 and 2011. (Turvallisuustutkinta 2012 p. 5)

Children under 12 months of age are still relatively immobile and do not wonder off on their own. However they can drown in very shallow water and very quickly. Children who are a bit older and already mobile but do not recognize dangerous situations or can't get out of water, need constant supervision. (World Health Organization 2014 p. 9) The survey by the MSB in Sweden showed that 20 % of the total 93 drowning incidents during 1998-2007 happened to pre-school children. In these cases the children were unsupervised for a short period of time e.g. while the parent or supervisor looked after another child, answered the phone, had a cigarette etc. These victims drowned in small ponds, pools or other small bodies of water e.g. a stream. A typical case was a small boy who just wandered off and was found drowned 200-300 meters from where he went missing. Parents do not appear to know how fast a small child can drown. The need for constant supervision of infants and small children can't be overemphasized, especially near water whether it be a bathtub, swimming pool or some other body of water. (Myndigheten för samhällsskydd och beredskap 2010 p. 4-6) The WHO – UNICEF World report on child injury prevention concludes that children under five years of age have the highest drowning mortality rate of all worldwide. The drowning rates peak in the age group 1-4. During

adolescence another, less dramatic peak can be seen. The same pattern exists throughout the world. In child drownings risk and circumstances are related to the developmental stage of the child. The high drowning rates for children aged 1-4 can be explained by the child becoming more mobile, wandering off but not yet being aware of hazards and dangerous situations. The increased risk during adolescence is a result of less supervision and increased independence, increased risk-taking and more frequent exposure to open water during work and leisure time. (World Health Organization 2008 p. 63)

2.5.3 Ethnicity as a risk factor

Ethnicity is another risk factor for drowning mentioned in the International Life Saving Federation - Drowning Prevention Strategy from 2015 (International Life Saving Federation 2015 p. 12). So how does a person's ethnic background affect the risk for drowning? This issue should be discussed in both a global and national context. There are certain regions of the world that have significantly higher drowning rates than others. A look at the WHO age-standardized drowning rates for different regions of the world reveal some interesting facts. The highest number for age-standardized drowning deaths, almost 8 per 100.000 population is in the African region. The African region does not have the highest drowning rate for infants and small children. This could be explained by the fact that other causes of death e.g. infant mortality, malaria, malnutrition, acquired immunodeficiency syndrome (AIDS) and so on claim infants and small children in this region to a much larger extent than in other parts of the world. Still the age-standardized drowning rate is very high in this region. As a comparison the European region has a drowning rate of just under 5 per 100.000 population. (World Health Organization 2014 p. 7 & 10)

On a national level Sweden a high-income country has a drowning rate of 1.0 per 100.000 for 2010-2013 (Svenska Livräddningssällskapet 2013). The second highest age-standardized drowning rate is in South East Asia, over 7 per 100.000 population. The Western Pacific region has an age-standardized drowning rate of 4.5 per 100.000 population. It should be mentioned that the WHO statistics for age-standardized drowning rates only include low- and middle-income countries in these regions. (World Health Organization 2014 p. 10) The comparison to a single, high-income country like Sweden is of course

unfair and is only done to prove what can be achieved through proper allocation of resources for drowning prevention measures during multiple decades. According to the ILS the drowning rate in South East Asia is actually over 10 per 100.000 population and over 39 per 100.000 for children under 17 years in some regions. The ILS estimates that even minor advances in evidence based drowning prevention measures could save 100.000 lives each year. (International Life Saving Federation 2015 p. 17)

Ethnicity as a risk factor for drowning should also be reviewed on a national level. We live in a global world where people for several reasons leave their home country looking for a better life somewhere else. High-income, democracies have in modern times experienced immigration waves for over a hundred years now. A look at the drowning rates from low- and middle-income countries and regions in the world (see above) suggests that drowning prevention measures are not up to par in these nations and regions of the world. Knowledge of water safety, swimming ability, self-rescue skills and so on are not what they should be, increasing the risk of a fatal drowning incident many times over. Thus a tradition of teaching water safety competencies is missing in many of the low- and middle-income countries preventing parents from communicating and teaching these skills to their children. This might also prevent parents from seeking help e.g. swimming education and teaching of self-rescue skills for their children. This becomes evident when people migrate from low- and middle-income countries with high drowning rates to high-income countries with lower drowning rates. According to the WHO – UNICEF World report on child injury prevention there are large differences in the drowning rates within high-income countries between population subgroups. Children and young people from racial or ethnic minorities have a two to four time higher risk of drowning than the general public. (World Health Organization 2008 p. 65) Immigrants unfortunately often represent a disproportionately large part of the fatal drownings incidents in the high-income countries. The study published by the MSB in Sweden 2010 revealed that children from the Middle East represented a disproportionately large percentage (11%) of the total number of fatal drownings incidents during the years 1998-2007 (Myndigheten för samhällsskydd och beredskap 2010 p. 12) The researchers speculated that a poor swimming ability and poor knowledge of water safety was a contributing factor in the fatal drownings incidents of these children. Many of them drowned in deep water leading to speculations that perhaps their friends were unaware of the fact that these children did not have sufficient

swimming skills to be in deep water. The MSB research suggests that there should be heightened supervision of children from non-European countries in Sweden to make sure that they do not take unnecessary risks and that they have sufficient swimming ability. Their parents should be taught water safety, rescue and resuscitation skills. In Finland the study launched by the Safety Investigation Authority on deaths among children and adolescents likewise revealed that non-European children and young adults were overrepresented in the fatal, accidental drowning incidents between 2009 and 2011. In the age category 0-12 years two drowning victims were non-European. In the age group 18-24, four victims were non-European. In total there were 17 fatal, accidental drowning incidents during this three year period among children under 17 years of age. The researchers pointed out that non-European children must be given the chance to get accustomed to water in a safe environment and learn how to swim early on. This is first and foremost the responsibility of the parents. (Turvallisuuustutkinta 2012 p. 30) According to the WHO – UNICEF World report on child injury prevention the reasons for why racial and ethnic groups are overrepresented in the drowning statistics of high-income countries are not well understood. Suggestions have been made that differences in swimming ability, lack of opportunities to learn to swim and lack of supervision in high-risk environments are partially to blame. (World Health Organization 2008 p. 65)

2.5.4 Medical conditions as a risk factor

There are certain medical conditions that show up in the drowning statistics as conditions that were at least partially to blame for the drowning incident occurring whether it led to death or not. Certain medical conditions occur more often among the older population such as cardiovascular and pulmonary (lung) diseases. Needless to say they do exist among younger individuals too but not in the same proportion. Different neurological diseases are also well represented in the statistics, epilepsy being one of the most common. Danish drowning statistics collected during the years 2001 to 2009 show that cardiovascular and lung diseases as well as neurological diseases make up the top three among medical conditions suffered by the victim prior to the drowning incident. (Moller et al. 2011 p. 45) Swedish research about why children drown revealed that medical conditions were at least a partial cause in 16 % of the fatal drowning incidents among children aged 0-17 years from 1998 to 2007. Epilepsy made up 50 % of these medical conditions while

the rest were other congenital, neurological diseases. A child suffering from epilepsy has a 5 to 15 time higher risk of drowning compared to a healthy child. (Myndigheten för samhällsskydd och beredskap 2010 p. 13 and 20) One could argue that there is a trend concerning medical conditions that are at least partially to blame for drowning incidents. They seem to consist of three major categories: cardiovascular, pulmonary and neurological diseases. Cardiovascular and pulmonary diseases are more common among older drownings victims and neurological diseases among children and young adults. Regarding medical conditions and drowning incidents the final cause of death might not be crystal clear in all cases. Inaccurate coding of the cause of death does happen. Researchers on Danish drowning statistics point to the fact that inaccurate coding of the cause of death might occur for example if a person suffers a heart attack, dies from the heart attack and submerges, “drowns” and yet the cause of death is reported as drowning. The same might happen the other way around so that a drowning incident causes heart failure and is coded as a heart attack. (Moller et al. 2011 p. 56)

2.5.5 Other risk factors

The International Lifesaving Federation - Drowning Prevention Strategy from 2015 mentions a few additional risk factors that are often connected to a heightened risk of drowning especially in developed nations and regions of the world. Being under the influence of alcohol when swimming, boating, fishing etc. is all too common in developed nations. This in combination with neglect of wearing floatation devices like lifejackets when fishing and boating etc. is clearly evident as contributing factors in drowning incidents (International Life Saving Federation 2015 p. 12) It is a sad fact that alcohol starts to play a part in drowning statistics among teenage drowning victims some as young as thirteen years of age or less. The MSB study published in Sweden in 2010 revealed that in 40 % of the fatal drowning incidents involving 13-17 old children in 1998-2007 the victim was under the influence of alcohol. Three out of four victims were boys. (Myndigheten för samhällsskydd och beredskap 2010 p. 15) In Finland the study launched by the Safety Investigation Authority on deaths among children and adolescents revealed similar results. In three out of five fatal, accidental drowning incidents between 2009 and 2011 among children 13-17 years of age, the victim was under the influence of alcohol. (Turvallisuustutkinta 2012 p. 29-30) Alcohol affects a person's balance, coordination, ability

to make judgements. Sun and heat only adds to these problems. Alcohol is also believed to have direct physiological effects on the body e.g. by increasing hypothermia. Alcohol has been linked to 25-50 % of adolescent and adult deaths associated with water recreational activities (World Health Organization 2008 p. 65)

Developing nations face a few additional risk factors. Illiteracy can lead to death if for example warning signs are not understood. Illiteracy as a risk factor also shows up in the drownings statistics for developed nations where many tourists drown due to not understanding or misunderstanding warning signs about for example dangerous rip curls, precipitous beaches or seafloors etc. Sometimes tourists do not understand the danger even though they might understand the meaning of the warning sign. Developing nations are many times densely populated something that contributes to among other things overcrowded water crafts. This in combination with neglect or unawareness of the simplest safety rules and the lack of proper equipment can spell disaster. The ILS suggests risk-awareness education and proper water craft regulation in order to deal with this problem in developing nations (International Life Saving Federation 2015 p. 12). The WHO lists key risk factors for drowning in their WHO Global Report on Drowning from 2014. In addition to the ones listed above the WHO mentions poor swimming skills and low awareness of water dangers as key risk factors for drowning. (World Health Organization 2014 p. viii)

2.6 Drowning prevention

By now the immense cost of drowning on a global scale has been established in this thesis. Now it is time to look at what the international community and the nations themselves do to prevent drowning incidents from occurring. The International Life Saving Federation - is an example of a multinational organization that is trying to prevent drowning incidents from occurring on a global scale. In 2015 The International Life Saving Federation published the ILS - Drowning Prevention Strategy that was to provide “a framework to reduce drowning deaths in the aquatic environment for nations/regions engaged in lifesaving” (International Life Saving Federation 2015 p. 1). The ILS has taken an approach that recognizes that drowning prevention measures planned and implemented in different

parts of the world have to be adapted to specific age groups i.e. different stages in a person's life and also to local environments and circumstances. The WHO states that drowning can be prevented with targeted drowning prevention measures. This can mean improving infrastructure like water supplies, bridges, levees and educating the public thus increasing awareness of water safety hazards. Preventive legislation and appropriate policies play a key role in building drowning preventive measures. An example of this can be a mandatory use of lifejackets, water craft regulation and much more. Research of course plays a significant role in refining and pointing out best practice as well as identifying new drowning prevention measures. (World Health Organization 2014 p. 15) The Swedish lifesaving federation SLS or Svenska Livräddningssällskapet has been campaigning for years for a law that would make it mandatory to have lifejackets on board for every person on a recreational water craft i.e. also on smaller boats. All other Nordic countries except for Sweden have this law in place, however Norway is the only Nordic country where the lifejacket by law has to be worn by the person on the boat. The SLS estimates that over 50 % of all fatal drowning incidents involving recreational water crafts or boating could be avoided by a mandatory use of lifejackets. (Svenska Livräddningssällskapet 2012b) The same finding has been made by the United States Coast Guard where a recent study of the records show that 50 % of the fatal drowning incidents in recreational boating could be avoided by a mandatory use of PFD or personal floatation devices (World Health Organization 2014 p. 16)

2.6.1 Adapted drowning preventive measures

As an example of adapted drowning preventive measures the ILS mentions a so called "life stage approach to drowning prevention" developed by Life Saving Victoria in Melbourne Australia. This particular drowning prevention model divides a person's life into six age categories: infants and toddlers in age group 0-4 year olds, children and young adolescents in age group 5-14, young adults in age group 15-24, adults in the next two age groups 25-34, 35-59 and older adults in the last age group 60+ year olds. For every age group there are some key drowning preventive strategies.

2.6.2 Infants and toddlers

In the first category important, drowning preventive measures are: to keep watch and remain within arms distance of the child. (International Life Saving Federation 2015 p. 12) A look back to chapter 2.5.2 in this thesis reminds us of the issue of toddlers wondering off and how most of the very young drowning victims are found close to where they were last seen alive. Therefore keeping an infant or toddler at arms distance near water is an effective and correctly dimensioned drowning preventive measure. This of course requires that at least one of the child's guardians has time and possibility to watch over the child at all times. In the study by the government authority MSB in Sweden in 2010 it was revealed that in 12 % of the fatal drowning incidents involving children aged 0-6, and in 23 % of the cases involving children aged 7-12, the drowning victim came from a single parent household. Single parent households were overrepresented in the drowning statistics 1998-2009 for children aged 0-17. This led the researchers to recommend that child health care services in Sweden should inform parents about the importance of constant supervision of small children around water. Also it was suggested that child health care services and preschools start building support networks for young parents to try to relieve them from excessive stress and workload. (Myndigheten för samhällsskydd och beredskap 2010 p. 18-21) Much depends on the amount of time and energy a parent has to supervise their child or children. In Finland the study launched by the Safety Investigation Authority on deaths among children and adolescents during 2009 to 2011 came to similar conclusions. The importance of constant supervision of children can't be overstated. When a small child drowns it is often a silent and fast chain of events. Therefore parents should be constantly aware of what the child is doing when he or she is close to water. To prevent child drownings the study concluded that parents have to be instrumental in giving their children early opportunities to become accustomed to water and learn how to swim in a safe environment. The Ministry of Social Affairs and Health should in cooperation with the Ministry of Culture and Education make sure that child health care services, preschools and the school health care system actively informs children and parents about water hazards. Parents should also be informed about the importance of accustoming children to water, the importance of swimming ability and the importance of constant supervision of children who are learning how to swim. (Turvallisuustutkinta 2012 p. 67-68)

A second very important drowning preventive measure for infants and toddlers is the provision of safety barriers around bodies of water, whether they be small pools, ponds, wells or something else. In the WHO report on drowning prevention from 2014 a lack of safety barriers or signs around water hazards in low- and middle-income countries is mentioned as an increased risk for drowning. Such hazards can be unsafe water crossings, open wells, uncovered manholes, ditches and things of that nature. (World Health Organization 2014 p. 12) In Sweden there is a law regarding the use of safety equipment for paddling pools. Shallow pools under 20 cm deep need no barrier or other safety equipment. Pools more than 20 cm deep require a 90 cm high protective, lockable fence. It must be impossible for a child to crawl under the fence. Alternatively the pool can have a cover or protective net that completely covers the pool. If a net is used to cover the pool the mesh can't be bigger than 50 cm and the net can't give way under a child's weight. In Finland Tukes i.e. the highest consumer safety authority has made guidelines for the use of home swimming pools (Tukes 2015). The guidelines recommend that the pools are no more than 30 cm deep for small children. Parents should supervise their children at all times when they use the pool. The pool should be placed so that it is always in sight. Studies made in Sweden about the use of protective fences around pools have shown that fences can reduce child drownings by up to 75 %. (Myndigheten för samhällsskydd och beredskap 2010 p. 18-19) The use of protective safety barriers around water hazards is an effective way to protect especially children from drowning. In high-income countries like for example Sweden legislation has been able to significantly increase the use of safety barriers around water hazards and reduce the drowning rates for small children. This has been partly possible due to systematic research on drowning prevention, reliable drowning statistics and sufficient resources. However the situation in large parts of the world especially in low- and middle-income countries is bleak and resources scarce. There is a long way to go for many low- and middle-income countries on this issue.

The first two and most important drowning preventive measures for infants and toddlers refer to keeping the child safe and alive. The next safety measure in the "life stage approach to drowning prevention" has to do with familiarizing the child with water. The first thing that needs to be said is that no familiarization measure can ever substitute the need for constant parental supervision over toddlers and small children around water.

In a survey by Blitvich et al. (2012 p. 114) about swim instructor beliefs about toddler and preschool swimming and water safety education, 84 % of the participants in the survey recognized constant adult supervision as the most important measure a parent can take to prevent toddler drowning. (Blitvich et al. 2012 p. 114) So what is the ideal age to start familiarizing a child with water? In the research by Blitvich et al. (2012 p. 113) 50 % of the survey participants considered less than 2 years to be the best age to start, 41 % said 2-3 years and only 9 % said over 4 years. Safety was considered by 61.5 % to be the most important reason for familiarizing a child with water. It is easy to see the benefits of starting early. Early familiarization with water lowers the threshold for learning important swimming and water competencies later in childhood. Equally important is to make sure that the first experiences for a child around water are positive and stress free. Parents should also be trained in performing CPR on children. CPR stands for cardiopulmonary resuscitation. CPR skills should be updated regularly. This of course should be a part of national child health care services to reach as many parents as possible. The WHO (World Health Organization 2014 p. 14) recognizes this by reminding of the importance of a fast rescue and that resuscitation must be done immediately at the scene of the incident in order to give the best possible outcome. Rescue and resuscitation skills should therefore be taught to as much of the population as possible. This requires nationwide programs and this in turn generally high education levels something that rarely is the case in low- and middle-income countries.

2.6.3 Children and young adolescents

The next age group in the “life stage approach to drowning prevention” recommended by the ILS (International Life Saving Federation 2015 p. 12) deals with children and young adolescents aged 5-14. The first drowning preventive measure mentioned in this category is learning resuscitation. In this age category this means learning how to save somebody else’s for example a friend’s life by performing CPR. The next drowning preventive measure in this age group is learning how to swim. The ulterior motive is that increased swimming ability will increase the chance for survival in a drowning incident. Swimming ability has a crucial and critical role in drowning preventive work. The sooner one learns to swim the better. The WHO (World Health Organization 2014 p. 15) also recognizes the importance of improving one’s swimming ability as one of the drowning preventive

measures. The issue of swimming ability will be dealt with to some extent in the coming chapters of this thesis. Another important drowning preventive measure for the age group 5-14 years are so called awareness programs where children are taught important facts about drowning prevention, swimming and water recreation in general. The life guard clubs and federations have an important role in teaching these skills to children and for example in Finland the Finnish Swimming Teaching and Lifesaving Federation has a Junior Lifesaver program for children 8-15 years of age. This program teaches children self-rescue and rescue techniques, swimming techniques, CPR and much more. (Suomen Uimaopetus- ja Hengenpelastusliitto 2016) In Sweden the SLS i.e. the Swedish national lifesaving federation has a close cooperation with elementary schools, grades 1-3. The SLS is behind Barnens Livräddningsskola or the “Lifesaving School for Children” a life-saving material that is distributed to all elementary schools around the country free of charge. This material is made in cooperation with government authorities on water safety. (Svenska Livräddningssällskapet 2016a)

All the national school curriculums in the Nordic countries include swimming education. This means that swimming education has to be arranged for the pupils in primary and secondary according to the requirements established within the curriculum. Primary and secondary schools play a significant role in the swimming teaching education in high-income countries like the Nordic countries. Almost all children can be reached through the school system. The years from five to twelve are important in a child’s life in learning how to swim. Parents hold the key to a child’s successful introduction to water. It is important to start the introduction to water early either privately or through swimming teaching courses or both. A good foundation and a positive attitude towards water created during the earliest years is easy to build upon within the school system. Needless to say that a good foundation and sufficient skills learnt during childhood will translate to a better swimming ability as an adult. However swimming and water safety skills need to be kept up during adulthood through regular practice.

The Nordic lifesaving federations have been campaigning for years for specifications in the national curriculums concerning the swimming teaching education. The school legislation that steers the content and formation of the national and thus the local and school curriculums has been too vague, leaving too much to decide for the local schools. In times

when local finances are limited freedom to decide leads to savings and restrictions especially in school subjects that cost a lot to teach. Swimming teaching requires more resources than many other school subjects. You need a safe place to teach i.e. preferably an indoor pool (at least for beginners), an instructor with sufficient skills, transportation, entry fees, supervision and so on. The amount of indoor pools in the Nordic countries is still not sufficient. Schools that have a long distance to the nearest pool have bigger costs for transportation. This usually means fewer swimming teaching lessons due to time and monetary restrictions. Despite this the majority of Nordic school children receive swimming education during primary and secondary school. However the amount of swimming teaching is too low and the specifications too vague concerning what should be taught.

Government authorities and lifesaving federations have been working together to improve the swimming teaching and lifesaving education in the schools. Studying the curriculums of the Nordic countries reveals that swimming teaching in general starts early, usually during the first two years in school but lifesaving and self-rescue skills are taught somewhat later on. In Sweden Skolverket or the Swedish national board of education was commissioned in 2006 to clarify the goals concerning swimming teaching in the fifth grade. Skolverket came to the conclusion that the pupils by the end of fifth grade should achieve the following skills: being comfortable in water, feel safe in water, be able to swim 200 meters in one go of which 50 meters on backstroke, be able to handle emergency situations in and around water and have basic knowledge of safe water recreational activities, boating and ice conditions. (Skolverket 2010 p. 4) In a Danish survey about swimming ability, lifesaving skills and general attitude towards swimming in Denmark in 2007 including 615 children aged 11-12 revealed that 74 % of the children knew at least one safety rule concerning water recreational activities and swimming. The most common answers were: “do not go out into deep water”, “do not swim directly after dinner”, “never swim on your own/alone”. Over 25 % of the children did not know one single safety rule about water recreational activities and swimming. (Dansk Svømmeunion 2007 p. 70)

The years between 5 and 14 are fundamental in shaping a person's attitude towards water, swimming, self-rescue, lifesaving and general safety measures concerning recreational activities in and around water. Parents play perhaps the most important role initially by hopefully setting a good example and creating a positive, encouraging atmosphere around

the child's first experiences in and around water. This should be followed by proper teaching of swimming techniques, knowledge of water safety, self-rescue, lifesaving, CPR and much more in preschool, primary and secondary school. Several improvements have been made to the curriculums in the Nordic countries during the past twenty years. The lifesaving federations have been instrumental in this work. The curriculum seem to go in a stricter more detailed direction where the local schools have less saying concerning the teaching process. This is important as swimming education seems to be a subject that suffers during economically difficult times.

2.6.4 Teenagers and young adults

The "life stage approach to drowning prevention" recommended by the ILS (International Life Saving Federation 2015 p. 12) has three major drowning preventive strategies for young adults aged 15-24. They are: learning resuscitation, learning to swim and awareness programs. This needs to be explained a bit further. The school system has by the age of 15 hopefully already done a great deal to improve a person's swimming, self-rescue, lifesaving and resuscitation skills. There is usually less swimming education in high-school. There are of course differences in and between high-income and low- and middle-income countries in how the schools systems teach water competency skills. There is an array of variables that affect the way and efficiency in which these skills can be taught in school. These can be: legislation, national curriculums, resources, experience/knowledge, co-operations, local environmental factors and much more. Not just swimming education but all drowning preventive measures must be adapted to local environments and conditions in order to be effective and work the way they are meant to work. The WHO recognizes this fact by saying that drowning preventive measures should always be integrated into local settings. In order to plan and implement effective drowning preventive measures one must understand local conditions and the way communities live around water. This is extra important in low- and middle-income countries where water many times "puts food on the table" so to speak, the infrastructure is weak i.e. bridges, water crossings etc. are fewer and many times unsafe or there is a heavy use of boats and other water crafts in everyday life and so on. (World Health Organization 2014 p. 16)

An early start and effective teaching of water competencies throughout elementary and secondary school is of utmost importance. The Swedish school curriculum for elementary and secondary school has since 2007 included an exact definition of swimming ability in line with the Nordic definition of 200 meters of which 50 on backstroke. This should be achieved before the end of fifth grade in elementary school. (Svenska Livräddningssällskapet 2016b). The overall goal is to achieve proper swimming ability and lifesaving skills before the end of elementary school. However people develop skills with different speeds. Even though results for swimming ability and lifesaving are generally on a reasonably good level in high-income countries there needs to be a back-up system in place for those who develop at a slower pace. With this in mind it is important that swimming education continues during secondary school and that pupils with a slower development have the chance to develop and learn also outside the school system. In Sweden 8 out of 10 elementary schools offer extra swimming education for free to those pupils who do not achieve the goals by the end of the fifth grade set by the national curriculum for elementary schools. (Skolverket 2010 p. 11) This of course is an ideal system in a high-income country with much experience from drowning preventive work. None the less there are important lessons to be learned from this. Swim clubs and lifesaving organizations also play an important role in giving additional swimming, self-rescue and lifesaving education to slow developers or to those who just want to learn more.

During the years from 15 to 24 a person becomes more and more independent. With puberty usually comes a change in behavior. Many surveys point to the fact that men are twice as likely to drown as women. This is true for every age group. (World Health Organization 2014 p. viii) In a study by Moran et al. (2012 p. 132) findings point to the fact that young male adults underestimate the potential dangers inherent in water activities. Males in this study consistently reported lower perceptions of drowning risk compared to females. This despite the fact that their swimming and survival skills were not significantly better. An underestimated risk of drowning may be a partial explanation to why men are more likely to drown than females. The study did not find sufficient proof that men overestimate their water competencies i.e. swimming ability, self-rescue skills though this has been thought to be true in previous research. It was suggested that this should be researched further with both adolescents and adults. (Moran et al. 2012 p. 132)

It has however been proven that children have difficulties in predicting their own swimming ability or water competencies. P-E Kjendlie et al. (2013a p. 2) point to the fact that young adults and children are not particularly good at accurately predicting what they can do in the water. It is common that skills and knowledge are perceived to be different from what they really are. The researchers suggest a teaching process that would focus on the knowledge of why certain skills are vital and how far the pupil has come in mastering these skills. (Kjendlie et al. 2013a p.2)

Over half of all annual, fatal drowning incidents in the world involve a victim aged under 25 (World Health Organization 2014 p. 6) Awareness programs for young adults should focus on the risk taking behavior pattern that is common for this age group. Teenage boys and young men should be the prime target without forgetting the girls. Programs should underline the importance of recognizing the difference between perceived skills and actual skills. Kjendlie et al. point to a crucial fact concerning drowning preventive work when they say that there is a lack of evidence-based research proving to what degree aquatic skills learned and performed under calm conditions e.g. in a swimming pool transfer to choppy or open water (Kjendlie et al. 2013a p. 2). People should be made aware of how quickly swimming ability, self-rescue skills and lifesaving abilities deteriorate in cold and choppy water compared to warm and calm water. The message should be: swim within your own limits, never in unknown waters, never alone, never swim under the influence of alcohol or drugs, always use a life jacket on boats and other water crafts and be aware of unsafe water crossings. This is easier said than done in developing nations where drowning preventive information may be scarce, the level of education low, flotation devices and water craft regulation none existent combined with bad infrastructure and overcrowding in many places.

2.6.5 Adults and older adults

The last three age groups in the “life stage approach to drowning prevention” recommended by the ILS (International Life Saving Federation 2015 p. 12) are adults aged 25-34, adults aged 35-59 and older adults aged 60 plus. The key drowning preventive strategies for these age groups include: boating safety and lifejacket regulations (25-34), rock fishing safety program, boating safety and education (35-59) and a combination of all of

the above (60+). In all age groups men are vastly overrepresented in the drowning statistics. This is true in every part of the world. Boating and fishing have traditionally been recreational activities enjoyed by men. A large part of the drowning incidents happen during the summer months. For example in the Nordic countries between the beginning of June and the end of August. A large part of these incidents happen during recreational activities on the water: when boating, fishing, swimming. Alcohol is often a contributing factor.

According to Danish drowning statistics for the years 2001-2009 there were 622 accidents that led to death from drowning. In 86 % of the cases the victim was male and in 68 % over 45 years of age. Alcohol was involved in 25 % of the cases. Fifty-nine percent of all accidents including all age groups happened at sea, 22 % of these involved a boat and some sort of recreational activity e.g. fishing, 18 % happened during swimming and 17 % during a boat ride at sea. (Moller et al. p. 11 and 26) Similar trends can be seen when studying Swedish drowning statistics from 1999 to 2015. Men are vastly overrepresented in the yearly drowning statistics constituting between 80 and 90 % of all fatal drowning incidents. A large part of the drowning victims are middle aged or older. In 2015 out of 122 drowning victims, 62 % were over 50, 42 % over 60 and 27 % over 70 years of age. The average age was 49, 60 % of all incidents occurred during June to August. A general trend in the drownings statistics involving middle aged men is that they do not wear life-jackets when fishing or boating and that alcohol has been consumed. In 2013 there were 30 fatal drowning incidents fishing or boating out of 129 in total. Only 1 out of 10 victims had worn a lifejacket while 6 out of 10 were under the influence of alcohol. Other contributing factors involved in fatal drowning incidents for over middle aged people are poor physical fitness, poor swimming ability or some form of disease. Attitudes towards wearing personal flotation devices are poor especially among over middle aged people. The SLS has been lobbying for a law that would make wearing a lifejacket mandatory on all smaller boats in Sweden. Unfortunately this has not yet come true. (Svenska Livräddningssällskapet 2016c)

The WHO (World Health Organization 2014 p. 15) has lobbied for requirements for the use of personal flotation devices or PFDs as well as for comprehensive boating regulations and enforcement. PFDs include lifejackets and other devices that are designed just to keep the wearer afloat. PFDs are suitable for children, recreational boaters, water-sports

participants in calm waters, close to shore and close to assistance or help in an emergency. Lifejackets are designed to prevent drowning at sea. Research in two Australian states has shown that a mandatory use of PFDs for recreational boaters have reduced the drowning rate significantly. The number of fatal drowning incidents for recreational boaters was 59 during a six year pre-legislation period compared to 16 during a five year post-legislation period. (World Health Organization 2014 p. 16) This and many similar positive examples should serve as encouragement to all nations considering a mandatory use of PFDs. It is hard to change ingrained, indifferent attitudes towards the use of PFDs in the older population. Unfortunately attitudes have a tendency to transfer from one generation to the next. A mandatory use of lifejackets could just be the answer to affect these attitudes and behavior. At the same time it would send the correct message to younger generations that wearing a lifejacket can save your life.

It is important to remember that developing nations many times face quite different problems than the ones mentioned above. Requirements or laws for the use of PFDs as well as comprehensive boating regulations and enforcement are often none existent. In addition the number of PFDs compared to the population is often very small. The lack of regulations for water crafts and overcrowding combined with few PDFs can easily spell disaster if for example a badly maintained, badly equipped, overcrowded vessel capsizes. Recreational boating is not as common in developing nations but then again many livelihoods depend on some form of fishing or transportation at sea.

2.7 Drowning preventive measures and actions

Because drowning is such a major public health issue globally it is important that the preventive measures reflect this. Drowning has to be fought on many levels. The preventive measures have to be both common enough and specific enough. The ILS suggests using four key steps when designing a public response to drowning prevention. These steps are: defining and controlling the extent of the problem, pinpointing the causes of the problem, developing and testing ways to deal with the problem and implementing extensively the preventive measures that are found to work. These key steps can be divided into primary, secondary and tertiary measures. When applied to a water safety issue like drowning they can take the shape of: universal, selected and individual measures.

Universal measures are aimed at the general population, selected measures at specific groups of people considered to be at a heightened risk, individual measures at those at risk or at specific, high risk locations. (International Life Saving Federation 2015 p. 14)

2.7.1 Primary measures

Examples of primary drowning preventive measures are: removing of a hazard e.g. draining unnecessary bodies of water (baths, ponds, wells etc.), creating barriers e.g. building flood control embankments in flood-prone areas, mandatory fencing for pools, ponds, ditches, protecting those at risk e.g. promotion of survival swimming for primary school children, increased access to learn to swim programs and training of water safety skills, increased awareness of the importance of constant supervision of children, education and legislation against the consumption of alcohol when boating, fishing, swimming etc., increased education in boating safety regulations and the use of PFDs. Primary drowning preventive measures can also be described as indirect measures. (International Life Saving Federation 2015 p. 15)

2.7.2 Secondary measures

Secondary drowning preventive measures aim to prevent injuries and death from happening in a drowning incident. They can also be described as direct measures. Examples of secondary drowning preventive measures are: onboard communication equipment on boats and other vessels enabling calling for help, providing emergency and rescue equipment, swimming with others, swimming and lifesaving education, CPR education to the general public. (International Life Saving Federation 2015 p. 16)

2.7.3 Tertiary measures

Tertiary drowning preventive measures try to minimize the negative impact of a drowning incident through proactive intervention and by reducing the risk of death and injury. Tertiary measures aim at improving the level of aftercare once a rescue has been made e.g. the level of first aid, finding the proper care according to the severity of the incident. (International Life Saving Federation 2015 p. 16)

2.7.4 WHO – ten drowning preventive actions on three levels

The WHO has identified ten main actions to prevent drowning. These actions are based on evidence and have been proven effective, achievable and scalable. However these actions need complementary measures e.g. best-practice models, a heightened public awareness through media, adapted measures that suit local environments and conditions and an involvement and understanding of what the local people see as the cause of drowning. The WHO's ten drowning preventive actions work on three levels: on a community based level, through effective policies or guidelines and through legislation. The first five actions work on a community level. These are: installing barriers and controlling access to water, providing safe places away from water to preschool children with capable child care, teaching school children basic swimming, water safety and safe rescue skills, training bystanders in safe rescue and resuscitation, strengthening public awareness and highlighting the vulnerability of children. Effective drowning preventive actions through policies, guidelines and legislation are: setting and enforcing safe boating, shipping and ferry regulations, building resilience and managing flood risks and other hazards on a local and national level, coordinating drowning prevention efforts with other sectors and agendas, developing a national water safety plan and addressing priority research questions with well-designed studies. (World Health Organization 2014 p. 18-19)

3 OBJECTIVES AND RESEARCH QUESTIONS

The objective for this thesis is to map out the development of swimming ability in the Nordic countries from 1996 to 2016. I will try to find a correlation between an improved swimming ability followed by a decrease in the drowning rates. The swimming ability of a nation seems to play an important role in drowning prevention. There are several other factors not related to swimming ability that affect the drowning rates e.g. alcohol abuse, cultural differences, falling through ice, not wearing personal floatation devices and so on. However these other factors do not decrease the importance of swimming ability, on the contrary. Therefore I wish to investigate further whether an improved swimming ability can lower the drowning rates? The research questions that I want to answer are:

- 1) How has swimming ability and drowning rates developed in the Nordic countries during the last twenty years?
- 2) How has swimming ability and drowning data been collected in the Nordic countries during the past twenty years?
- 3) Has there been an improvement in swimming ability followed by a decrease in the amount of fatal, unintentional drowning incidents in the Nordic countries during the last twenty years?
- 4) Is there a correlation between an improving swimming ability and declining drowning rates?

3.1 Theoretical frame of reference

As a theoretical frame of reference this thesis builds upon the International Lifesaving Federation's (ILS) drowning prevention strategies – a framework to reduce drowning deaths in the aquatic environment for nations/regions engaged in lifesaving, the 2015 edition, the ILS Drowning Data and Research Survey Report from 2012 as well as the World Health Organization's 2014 Global Report on Drowning – Preventing a leading killer. These documents form the foundation to defining a drowning incident, methods for and problems with collecting drowning statistics, drowning prevention in theory and drowning preventive best practices. These documents also reveal the role and importance of swimming ability as a drowning preventive measure. The national surveys on swimming ability and drowning incidents in the Nordic countries also include valuable information on the level, role and development of swimming ability in a drowning preventive context.

3.2 Key words and concepts

Key words and concepts in this thesis are: drowning incident, drowning statistics, drowning risk factors, drowning prevention, swimming ability, self-rescue skills, Nordic definition and correlation. A drowning incident can be both fatal i.e. the drowning leads to death or non-fatal a so called near-drowning incident where the victim survives. Some Nordic countries keep statistics over near-drowning incidents. However in this thesis the focus is clearly on whether an improved swimming ability can reduce fatal drownings? Drowning statistics is data that reveals the number of drowning incidents e.g. per year as

well as more detailed information about the drowning incidents e.g. contributing drowning risk factors. The words drowning statistics and drowning data are used as synonyms in this thesis. Drowning risk factors are factors that increase or decrease a person's chance for survival in a drowning incident. Drowning risk factors can be e.g. gender, age, ethnicity and swimming ability. Drowning prevention means measures that are aimed at reducing drowning incidents. Drowning preventive measures will be dealt with to some extent in the coming chapters. Swimming ability in this thesis means swimming ability in line with the Nordic definition of swimming ability unless otherwise stated. This thesis strives to find a correlation between an improved swimming ability and decreasing drowning rates in the Nordic countries. Self-rescue skills are skills that are meant to improve one's ability to survive in a case of emergency in the water. Self-rescue skills is knowledge about what to do and how to act in an emergency situation in the water and being able to act accordingly.

4 METHOD

4.1 A longitudinal study

First of all this thesis is a longitudinal study of swimming ability and drowning rates in the Nordic countries from 1996 to 2016. According to Jacobsen (2012 p. 73) a longitudinal study is a research method used for comparisons over time. Therefore the research design must use observations or measurements of the studied phenomenon or research subjects at several points in time. In other words the research design must produce time series data. This type of design focuses on changes within a group over time. Even though e.g. the survey questions are the same, the research subjects typically vary from time to time in a longitudinal study. The research subjects are chosen randomly from the same research population at different times. Provided that the two research populations are comparable you can study changes and development over time. A longitudinal research design only reveals changes on a group level from one time to another. Using this type of design one might also be able to reveal information on how different factors co-vary. (Jacobsen 2012 p. 73-74) An example of co-variation could be that there is a tendency that men in general perceive their swimming ability to be better than it really is and

women on the other hand are more modest and realistic in their estimation of their swimming ability. In other words being male or female affects the perception and estimation of ones swimming ability. Secondly this thesis is a literature study that uses almost exclusively secondary data. In other words statistics and data that has already been collected, analyzed and published. The thesis strives to map out the development of swimming ability and drowning rates in the Nordic countries from 1996 to 2016.

4.2 Data collection method

The drowning data used in this thesis has been available through the WHO and the ILS as well as through the national lifesaving federations and national statistics bureaus in the Nordic countries. A common practice is that national lifesaving federations collect preliminary drowning data throughout the year. This is later followed by official drowning statistics from the national statistics bureau. Larger and longer studies of drowning incidents and drowning rates usually involve a governmental authority e.g. MSB in Sweden, Statens Institut for Folkesundhed in Denmark, Tukes in Finland and so on. Such studies have been available either through databanks kept by national lifesaving federations or by the authorities themselves. The national lifesaving federations in the Nordic countries or the swimming federations play a vital role in keeping track of studies and research data on swimming ability and drowning research. Databanks or archives are kept available through the internet free of charge.

I have gathered data on swimming ability in the Nordic countries by systematically searching for studies on swimming ability on the internet and in the scientific database Sports Discus. Most of the studies have however been available to me through the World Wide Web. I have had a network of Nordic specialists and researchers helping me with finding relevant studies on swimming ability in a drowning preventive context. Articles in the International Journal of Aquatic Research and Education have been a valuable source to me. The Nordic swimming ability surveys from the last twenty years are quite detailed in general. The amount of information per survey is large. My goal has been to map out the development of swimming ability in the Nordic countries during the last twenty years for both adults and children. The most interesting data has been the percentage of the researched group, e.g. children in fifth grade of primary school that are able to

swim in accordance with the Nordic definition of swimming ability. Data on background variables that affect swimming ability is also of interest. This can be e.g. data on the amount of swimming education given during a school year, data on during what grade and to what extent swimming education is arranged, data on how swimming ability is affected by gender, age group, level of education and level of income. Other interesting facts are: the amount of indoor pools in the country, regional differences in swimming education and swimming ability and much more.

Data collection methods and the regularity with which data has been collected in the Nordic countries has varied. Therefore swimming ability and drowning data is not available for every year for the past twenty years. The methods for collecting data has varied and so has also the quality and the quantity of the data. Multiple studies on both swimming ability and drowning incidents have been made during the past twenty years. Some of the studies have been extensive covering several years while others have been less extensive covering only e.g. the previous year. Typically studies on swimming ability in the Nordic countries are made with an interval of five to six years or even more. The studies on swimming ability wish to reveal the current level of swimming ability and whether there has been an improvement or decrease in swimming ability since the last study. The most common instrument for swimming ability studies are postal surveys or web-based questionnaires.

Studies on drowning incidents are usually more extensive, covering sometimes up to ten previous years. Some of the studies focus on child drownings while others on the population as a whole. These studies cover a long time period and therefore require substantial financial resources. Understandably they are not that common. It seems as if studies of drowning incidents and drowning rates require a longer perspective to enable an effective analyses of larger, ongoing drowning trends. Shorter, less extensive drowning studies do also exist however. Drowning data or drowning statistics as such is available to a reasonably satisfying degree for the past twenty years. However drowning data is not available for every year and the methods for collecting drowning data has varied. There are many problems associated with collecting reliable drowning data. This has been discussed to some degree in the previous chapters of this thesis. (see above p.15-18) Some of the Nordic countries have been publishing detailed, yearly reports on drowning rates since the

early 21st century while other Nordic countries publish less frequently and less extensive information. All data on both swimming ability and drowning incidents for this thesis has been collected from multiple sources over a one year period from November 2015 to November 2016. I have been solely responsible for choosing the data for this study and no external quality control of the sources has been made.

4.3 Data analysis and interpretation

One of the more demanding aspects of this thesis is analyzing and interpreting drowning and swimming ability data. Especially drowning data can be difficult to analyze correctly and comprehensively. This has many reasons. Data collecting methods have varied between the Nordic countries and between international and national actors. An example of good data collecting comes from Sweden where multiple sources make up the drowning statistics for the time period under investigation in this thesis. This is a good example of how drowning data can be collected in an ideal situation. There is high quality, complete and comprehensive drowning data provided on a yearly basis combined with longer and larger studies on the subject revealing long term trends and further increasing the validity and reliability of the Swedish national drowning data.

4.4 Research ethics evaluation

This thesis was commissioned by the Finnish Swimming Teaching and Lifesaving Federation during the fall of 2015. It is my degree thesis for a bachelor's degree in sports and health promotion. As a student at Arcada – University of Applied Sciences I have not received any form of compensation for writing this thesis. I have not experienced any external pressure during the writing process. The material used in this thesis consists exclusively of secondary sources. All sources have been referenced, documented and are available to the general public. The use of certain sources have required written consent by the owner. This has been applied for and granted by e-mail. No material used in this thesis exposes the identity of the research subjects. Therefore the integrity of the researched subjects has never been compromised. All data, all facts have been presented accurately, truthfully in their original form without any manipulation from my part. This thesis is a longitudinal study covering twenty years and four countries. Finding sufficient,

relevant material has proven to be a long and laborious process. I have received help from numerous swimming teaching and lifesaving experts throughout Scandinavia. These experts have provided valuable insights into a field that I was not well acquainted with. Several experts have meant differing opinions on certain subjects concerning swimming ability and drowning prevention. My job is to accurately and truthfully portray the development of swimming ability and drowning rates in the Nordic countries from 1996 to 2016. At the same time I have to consider multiple opinions on swimming ability and drowning prevention in creating a balanced and comprehensive analysis on the subject.

5 RESULTS

5.1 Nordic drowning statistics

This chapter initially presents drowning statistics for each Nordic country included in this thesis. After that swimming ability research from the respective countries is presented.

5.1.1 Drowning statistics Finland

Finland has the highest drowning rate of all the Nordic countries. Depending on what statistics are used it varies from 2.4 (WHO) to 3.16 (ILS) per 100 000 population (World Health Organization 2014 p. 54) (International Life Saving Federation 2012 p.11). In the ILS statistics the data was collected from media reports and official statistics by the national statistics bureau Tilastokeskus for 2008. The ILS data included only unintentional deaths by drowning. The Finnish Swimming Teaching and Lifesaving Federation (SUH) has been collecting advance data on fatal drowning incidents in Finland since 1999. The data includes Finnish citizens and is done by collecting press clippings. There are monthly updates and publications, during the summer months June to August twice a month. The data includes the amount of fatal drowning incidents, the gender of the victim and how and where the incident occurred. The data consists only of fatal water safety accidents i.e. excluding drownings in a bathtub or drownings by suicide. The official drowning statistics for each year can be found later in the national statistics bureau's Tilastokeskus databank. Both the official and the preliminary drowning rates are published by SUH. (Suomen Uimaopetus- ja Hengenpelastusliitto 2016b)

According to official long term drowning statistics approximately a 1000 people died each year from drowning in Finland in the 1930s (Suomen Uimaopetus- ja Hengenpelastusliitto 2016c). During the 1930s the Finnish Swimming Association started developing swimming teaching and lifesaving education in Finland. (Ilmanen 2005 p. 57-58) Between the 1930s and 1940s the drowning rate dropped from a 1000 to 500 fatal drowning incidents a year. This rate of 500 was reasonably stable for over ten years (Suomen Uimaopetus- ja Hengenpelastusliitto 2016c). In 1956 the Finnish Swimming Teaching and Lifesaving Federation was founded and took over the responsibility for developing swimming teaching and lifesaving education in the country. (Ilmanen 2005 p. 59-60) The drowning rates began to drop again during the 1950s a trend that has continued to this day. In the 1960s the number was 400, in the 1980s, 250-300, in 2000 around 200 and since 2007, 170-190 a year. (Suomen Uimaopetus- ja Hengenpelastusliitto 2016c)

According to the Finnish Swimming Teaching and Lifesaving Federation a large part of the fatal drowning incidents in Finland could be avoided by a few simple measures: with the correct attitude towards water safety, sufficient equipment (i.e. on boats, shorelines, beaches, on ice etc.) and by being sober on/in the water. There is a clear rise in the drowning incidents during the summer months June to August in Finland. In over 50 % of all fatal drowning incidents in Finland the victim is under the influence of alcohol. A large part of the drowning victims who drown at sea or on the water have not been wearing a lifejacket or other personal floatation devices. Ice conditions during the winter months can vary greatly and should always be investigated each time before going out on the ice. Men are overrepresented in the Finnish drowning statistics e.g. in 2011 there were 125 preliminary fatal drowning incidents registered by the SUH, 110 were men and 15 women. The official number for 2011 was later registered as a 163 fatal drowning incidents. (Suomen Uimaopetus- ja Hengenpelastusliitto 2016c)

A study launched by the Safety Investigation Authority or Onnettomuustutkintakeskus collected information on all drowning deaths from 1.4. 2010- to 31.3.2011. The total number of drowning incidents for this period was 329, of which 213 were considered accidental deaths by drowning. There were three main categories for accidental deaths by drowning: swimming-related accidents (32%), boat-related accidents (30%) and slipping, falling and stumbling into water (25%). A large part of the swimming-related accidents

happened in shore water and during short swims. A large part of the boat-related accidents had little to do with actual boating and happened close to shore while operating a small boat e.g. rowing boat. Falling through ice can be considered a fourth category as 7 % of the accidental drowning deaths occurred this way. Many of the accidents, 110 (48%) happened in a lake, 51 in the sea, 21 in rivers, 14 in ponds and 5 in indoor pools. The remaining 26 died in smaller bodies of water e.g. ditches, brooks etc. Alcohol plays a significant part in Finnish drowning statistics and 59 % of the victims were under the influence of alcohol in the Safety Investigation Authority study. Most victims were between 50 and 79 years of age. Under 10 victims were under 18 years of age and eight of them between 0-12 years of age. In 195 cases (85%) out of the 213 accidental deaths by drowning, the victim was male. (Turvallisuustutkinta 2011 p. 6-7)

The Safety Investigation Authority concludes that approximately 200 fatal drowning incidents a year is too much. It is suggested that drowning preventive work should be done through several measures, implemented simultaneously. The best measures for good water safety is: high personal abilities to function e.g. swimming ability, self-rescue and lifesaving skills, the right equipment e.g. onboard boats, lifejackets and other PFDs, fire extinguishers, updated sea-charts, boat radio and phone. On shores and beaches there should be lifesaving equipment and an overall safe environment created. Knowledge of the weather, wave conditions, local currents, sea-floor, rocks etc. improves water safety significantly. The need for constant supervision of small children near water can't be overstated. (Turvallisuustutkinta 2011 p. 124-128)

The Safety Investigation Authority suggests that concrete drowning preventive measures are formulated at the highest level of state. Improvements need to take place in how drowning data is collected in order to enable correct drowning preventive measures and a correct and effective use of preventive resources. In Finland the blood alcohol limit in boating is 1.0 per mil, however this does not apply to rowing boats. Rowing boats need to be included in the legislation and monitoring increased on small lakes. There should also be a mandatory use of lifejackets in all boating. Finnish legislation does not require that you have a lifejacket onboard for every person on a rowing boat. The legislation requires that you have a lifejacket onboard for every person on a motorboat over five meters long. The lifejackets do not need to be worn by the passengers however. Wearing

a lifejacket should be mandatory in all boating. The Safety Investigation Authority recognizes that good swimming skills are essential in fighting drowning. A large part of the fatal drowning incidents occur close to shore or during short swims, improved swimming ability can improve the possibility of self-rescue and rescue. Swimming instruction in schools, especially primary school needs to be improved so that everybody learns to swim during primary school. The SUH and the Finnish National Board Of Education are working together on improving the status of swimming education in the school curriculums. The SUH also gives technical advice to indoor swimming pools and lobbies for an increased number of indoor pools throughout the country. The SUH has also been instrumental in developing and implementing national water safety campaigns e.g. Viisasti Vessillä in cooperation with authorities, organizations and private sector actors (Turvalisuustutkinta 2011 p. 128-131)

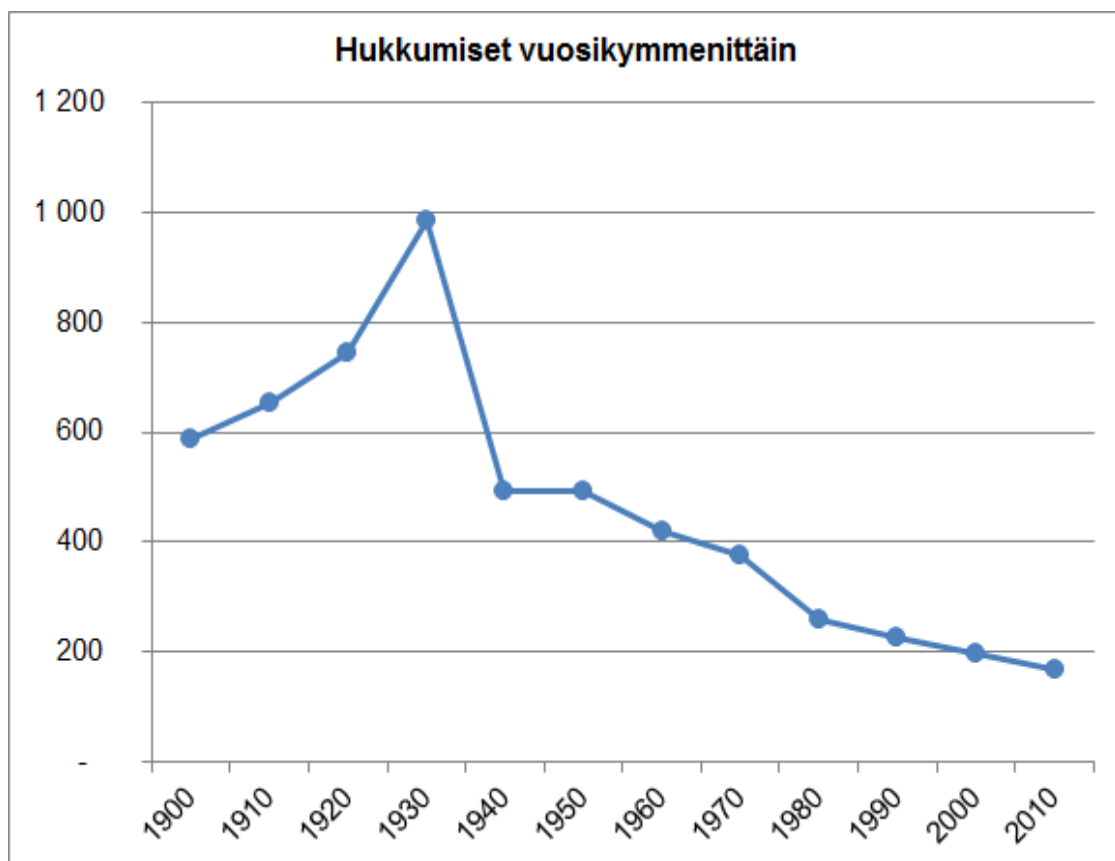


Figure 1. Long term drowning statistics in Finland (Suomen Uimaopetus- ja Hengenpelastusliitto 2016c)

5.1.2 Drowning statistics Sweden

Sweden has the lowest drowning rate of the Nordic countries. It is either 0.88 or 1.74 per 100 000 population depending on what statistics you look at (World Health Organization 2014 p.58) (International Life Saving Federation 2012 p. 11-12). Mind you that the statistics reported to the ILS Data and Research Survey report in 2012 was for the year 2010 when there were exceptionally few fatal drowning incidents in Sweden, only 79. It should also be said that the ILS data included only unintentional deaths by drowning. The ILS data was collected from self-generated data, media reports and central death registry. (International Life Saving Federation 2012 p. 12). If you look at the average drowning rate for 2000-2009 and 2010-2015 provided by the Swedish national lifesaving federation SLS the drowning rates are 1.3 and 1.2 respectively per 100 000 population (Svenska Livräddningssällskapet 2015 p. 2). The SLS makes a summary of all drowning incidents every month and in January each year the annual drowning statistics are published. The drowning statistics include all fatal drowning incidents in Sweden plus Swedish citizens who drown abroad. The drowning statistics do not include drownings by suicide. The SLS uses several sources in collecting drowning data. These are: media reports and data collected by SLS local and regional agencies. The data is verified with police and emergency services. The drowning data is also checked on a regular basis with other official governmental sources like the MSBs IDA database for rescue operations and with central death registry provided by the National Board of Health and Welfare or Socialstyrelsen. Since 2002 the Swedish drowning statistics have included foreign citizens. (Svenska Livräddningssällskapet 2016e)

A look at the long term drowning statistics reveal a similar development seen in Finland. In the beginning of the 2000th century approximately 1000 people drowned each year in Sweden. During the 1940s the number dropped to around 500 a year or 8.2 per 100 000 population. During the 1960s the number continued to decline to around 340, in the 1970s 250, 1980s 170, in the 1990s 150 and in the beginning of the 21st century to 120 fatal drowning incidents a year. In 2009 the number was 82 and under 100 annual incidents for the first time in Swedish history. This was followed by a string of good years with under 100 drownings a year from 2009-2012. In 2013 the number increased to 129, in 2014, 137 and 2015, 122. (Svenska Livräddningssällskapet 2015 p. 1-2)

Swedish drownings statistics have many similarities with Finnish drowning statistics. A large part of the drowning victims are over 50 years of age, usually between 60 and 70 %. Between 20 and 30 % are over 70. Very few children drown. A research by the MSB (see above) conducted for 1998-2007 investigating child drownings in Sweden for children aged 0-17 revealed only 93 fatal incidents for the entire time period. Sixty percent (60%) of the victims were under seven years old and the majority were boys. On average under 10 children drown each year in Sweden (Myndigheten för samhällsskydd och beredskap 2010 p. 8)

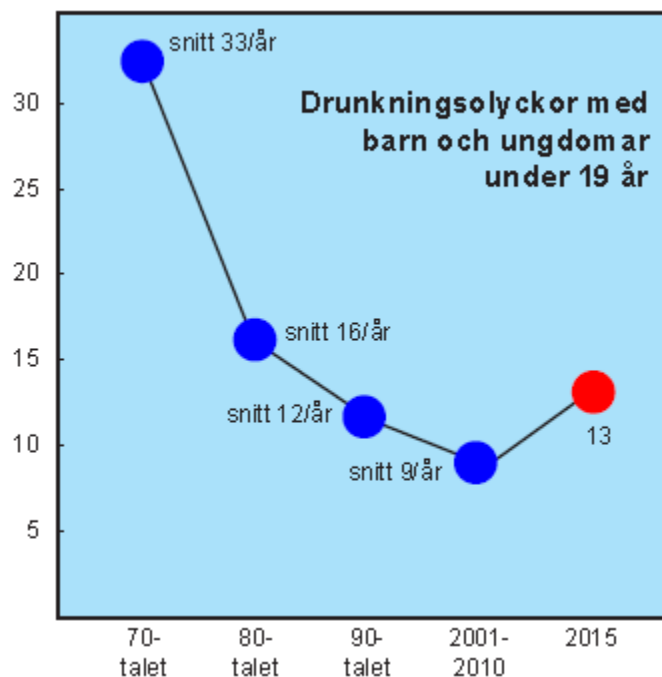


Figure 2. Drownings children under 19 years of age in Sweden 1970-2015 (Svenska Livräddningssällskapet 2015 p. 4)

The drowning rate in Sweden has steadily declined during the 20th and the beginning of the 21st century. The last few years have shown a slight but likely temporary increase in the drowning incidents. Males have always been and are still vastly overrepresented in the drowning statistics in Sweden. This is believed to be partly due to male risk taking behavior and risk prone recreational activities. Among the middle aged and older population ingrained, unsafe attitudes towards water safety is partly to blame. The influence of alcohol and a negligence to wearing PFDs is a lethal combination clearly visible in the drowning statistics. Just like in Finland a large part of the drowning incidents happen in smaller lakes, rivers and other smaller bodies of water. It is believed that e.g. a small and

many times familiar lake gives people a false sense of security that leads to riskier behavior i.e. not wearing lifejackets or being under the influence of alcohol or both. The SLS has been campaigning for years for a mandatory use of lifejackets during boating. This is said to be the single most effective, drowning preventive measure. It is estimated that this could save between 20 and 30 lives every year. In 2007 the SLS conducted a survey on attitudes towards water safety among the Swedish population. The survey also asked the participants to evaluate their swimming ability. The survey revealed that many Swedes have not tested their swimming ability in years, men are more prone to risk taking behavior and drink more alcohol in conjunction with recreational water activities e.g. fishing, boating etc. Six out of ten victims that drowned during boating in 2013 were under the influence of alcohol. One out of ten had been wearing a lifejacket. This in combination with a reasonably high age, bad physical condition, inadequate swimming ability or some form of physical illness greatly increases the risk of drowning. In the years 2000-2015, 80-90% of the drowning victims have been male. A large part of the fatal drowning incidents occur during the summer months June to August. Warm and sunny summers usually causes an increase in the drowning rate. Long term trends show an overall decline in Swedish drowning statistics, warm summers cause more drowning incidents on shorelines and beaches. There has been no long term decline in fatal drowning incidents in boating accidents. At the same time one must remember that the amount of boats has risen during the last decades, i.e. in reality there might be a slight decline in these accidents after all. The amount of ice-related fatal drownings show a long term decline as well as “other” drowning incidents that do not have an easily defined category or cause. Drownings among the young and children show a long term decline as well. The SLS has had a zero tolerance towards child drownings for years.

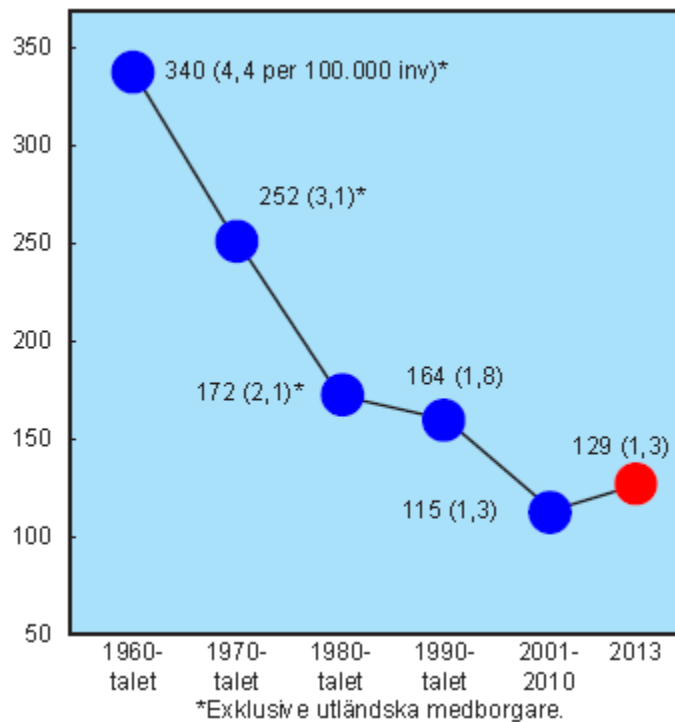


Figure 3. Drowning statistics in Sweden 1960-2013 per 100 000 population
(Svenska Livräddningssällskapet 2013 p. 1)

5.1.3 Drowning statistics Denmark

According to the ILS Data and Research Survey report in 2012 the Danish drowning rate per 100 000 population is 2.27. This number is based on all deaths i.e. both intentional and unintentional deaths by drowning in Denmark for the years 2001-2008. The data was collected from self-generated data, media reports and central death registry. (International Life Saving Federation 2012 p. 11-12) According to the WHO Global Report on Drowning from 2014 the drowning rate in Denmark is 1.2. This number is estimated based on drowning statistics for 2012. (World Health Organization 2014 p. 53) A more accurate and useful drowning rate for drowning preventive work is the rate per 100 000 population for accidental deaths by drowning. This number can be found in Danish drowning statistics separately for different age groups for the years 2001-2009. The first age group is 0-14 years old where the drowning rate has dropped from 0.5 per 100 000 population to almost zero. The next age group is 15-24 year olds where the drowning rate has dropped from 1.5 to 0.5 per 100 000 population. The third age group is 25-44 year olds where the drowning rate has dropped from 1.0 to 0.5 with a slight increase in 2008-2009. The fourth age group is 45-64 year olds where the drowning rate has fluctuated during 2001-2009

from 1.8 to 2.3 and back again. In the last age group for +65 year olds the drowning rate has also fluctuated from 1.5 to 2.7 and back again per 100 000 population. (Moller et al. 2011 p. 49)

In Denmark drowning statistics are collected by Trygfonden a national authority on safety and protection. TrygFonden cooperates with the national authority on health and welfare, Statens Institut for Folkesundhed (SIF) and Syddansk Universitet. TrygFonden and the Danish swimming federation, Dansk Svømmeunion publish drowning data. A longitudinal study was made on fatal drowning incidents in Denmark for the years 2001-2009. The study also looked at the long term development of these incidents for the years 1970-2009. The report was published in 2011. This study has been continued and data published in 2014 covering the years 2001-2012 and 1970-2012 respectively.

In Denmark 1117 people died as a result of drowning during 2001-2009, 622 or 56% drowned as a result of an accident and 383 or 34 % committed suicide by drowning. In 108 incidents or 10 % the chain of events that lead to death by drowning could not be established. The following text focuses on the accidental deaths (622) by drowning. Danish drowning statistics share similarities with Finnish and Swedish drowning statistics. Men are vastly overrepresented in the accidental deaths by drowning. The victim was male in 86 % of the 622 incidents. In 68 % of the fatal drowning accidents the victim was over 45 years old. The victim was under 18 years old only in 7 % of all cases. Alcohol was involved in 25 % of the fatal drowning accidents. A majority or 59 % of the accidents happened at sea or along the coastline. Only 8 % of the accidents happened in a lake. This can be explained by the small number of lakes in Denmark. The most common activities enjoyed prior or in connection with the drowning incident were: recreational boating (22%), swimming and bathing (18%) and drowning while boating on the open sea (17%). In 2001-2009 there were 113 accidental deaths by drowning in connection with swimming and bathing, 18 % of these happened to children 5-14 years old and 62 % to people over 45 years of age. Out of all fatal accidents in connection with recreational boating and boating on the open sea, 53 % happened to people between 45-64 years old. Danish drowning statistics include foreigners who drown in Denmark. They made up 30 % of the fatal drowning accidents that happened in connection with swimming and bathing during

2001-2009. The summer months June to August claim far more drowning victims than other months during the year. (Moller et al. 2011 p. 11 & 25-28)

Looking at the long term development of fatal drowning accidents in Denmark one can see similar trends as in Finland and Sweden. The amount of fatal drowning accidents has steadily declined in Denmark. From 1970 to 2009, 7414 people died as a result of drowning in Denmark, 3141 or 42 % were accidental deaths by drowning. In 1970, 139 people died in a drowning accident. In 2009 this number was only 49. In 2012, 104 people died from drowning in Denmark of which 57 by accident (Dansk Svømmeunion 2014b). Accidental child drownings and drownings among young adults and adults under 45 years of age have declined steadily. The development among 45-64 year olds and +65 year olds has been more modest or even slightly negative. The drowning statistics include the development of the drowning rate per 100 000 population for separate age groups concerning accidental deaths by drowning during 2001-2009. (Moller et al. 2011 p. 47-48) Like in Finland and Sweden the middle aged population over 45 years seem to be the most difficult to reach and affect through drowning preventive measures. Old habits die hard and indifferent attitudes towards water safety seem difficult to change.

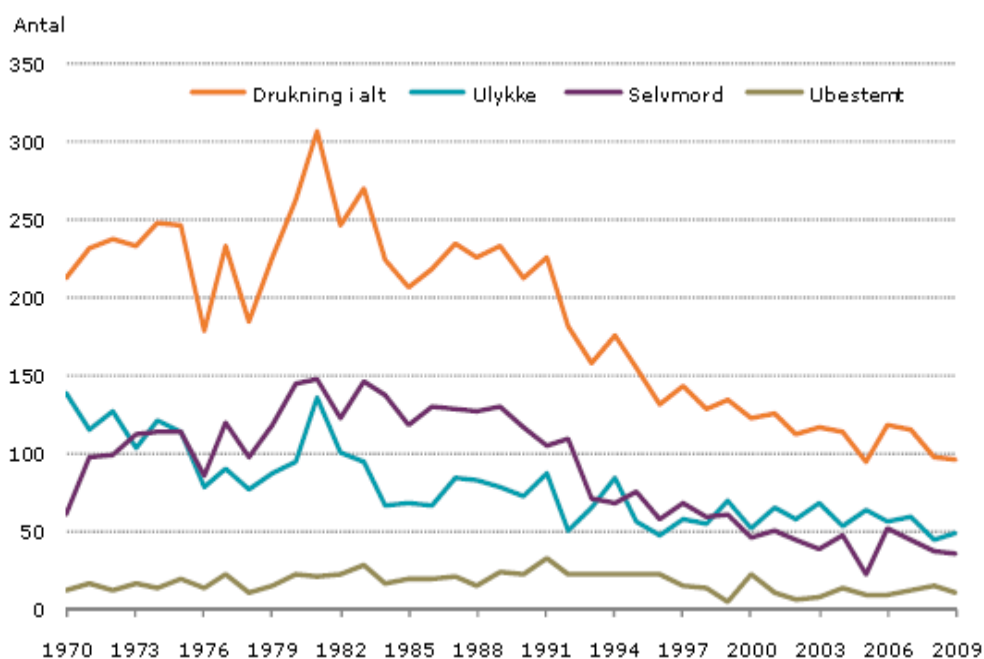


Figure 4. Long term drowning statistics in Denmark, blue colored line = unintentional drownings (Moller et al. 2011 p. 48)

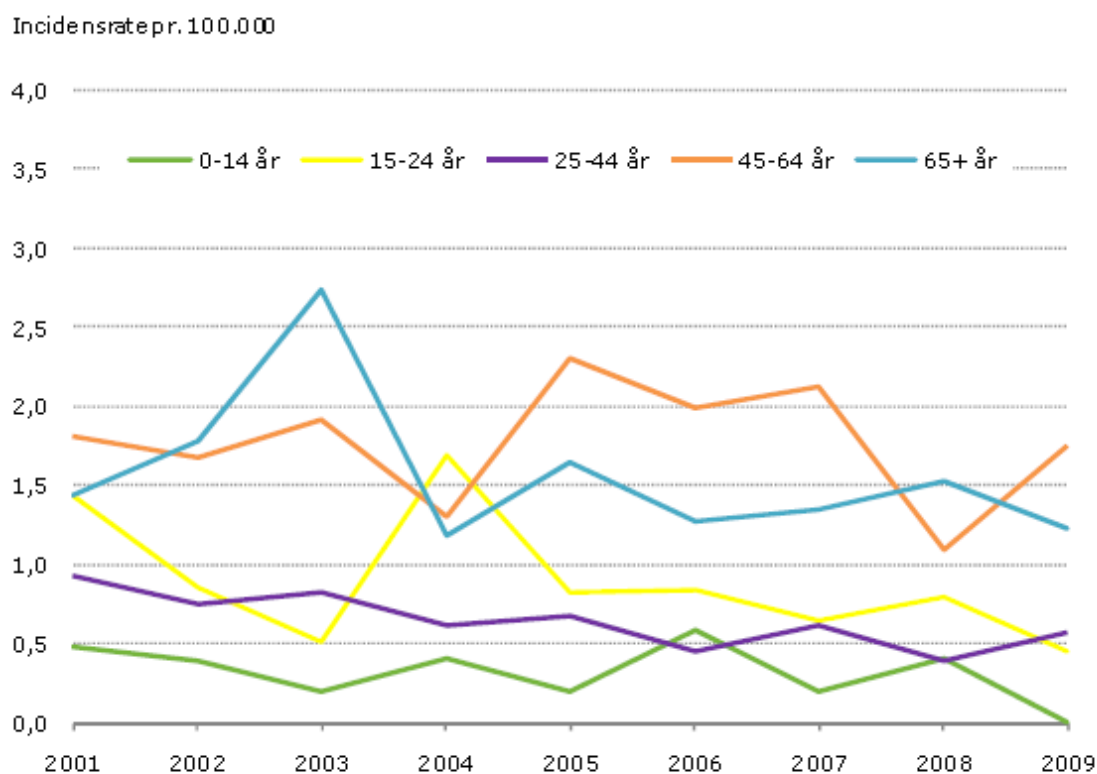


Figure 5. Drowning rate in Denmark 2001-2009 per 100 000 population/age groups
(Moller et al. 2011 p. 49)

5.1.4 Drowning statistics Norway

According to the ILS Data and Research Survey report in 2012 the drowning rate in Norway per 100 000 population for 2009 was 2.78. The data was collected from central death registry and hospital records and included both unintentional and intentional deaths by drowning for 2009 (International Life Saving Federation 2012 p. 11-12) According to the WHO World Drowning Report from 2014 the estimated drowning rate for Norway in 2012 was 1.4 per 100 000. (World Health Organization 2014 p. 56). Drowning statistics in Norway are collected by the national statistics bureau Statistisk Sentralb Byrå (SSB) and Norsk Folkehjelp (NFH). The statistics collected by the SSB includes only Norwegian citizens and people who permanently live in Norway. Drowning statistics in Norway are divided into three categories: drowning from shore, drownings during sea transportation and drownings by suicide. The NFH collects drowning data from press clippings. This provides faster and more nuanced information about drownings and also includes

foreigners who drown in Norway. The downside with media reports is that they do not always tell the whole story and might lead to under-reporting. The national lifesaving federation Norges Livredningsselskap publishes drowning statistics from both the SSB and the NFH. A summary of all drowning statistics from 1998-2011 has been made and is available through the lifesaving federation. More recent data from 2010 to 2014 is also available. (Norges Livredningsselskap 2015)

A look at the drowning statistics collected by the SSB and NFH from 1998 to 2011 reveals a slow but steady decline in the drowning rates. Men are just like in Finland, Sweden and Denmark vastly overrepresented in the drowning statistics. In 1998 according to SSB statistics there were 139 fatal drowning incidents in Norway. In 102 cases the victim was a male. These numbers include both intentional and unintentional drownings but exclude foreign citizens, 36 deaths were intentional (suicides). A significant drop in the drowning statistics collected by the SSB can be seen in 2006 when the number of fatal drowning incidents drops from 139 incidents in 2005 to 114 in 2006. The lowest number of the time period 1998-2011 can be seen in 2008 when there were only 86 fatal drowning incidents in Norway. In recent years the number has been just under or over 100 incidents a year. In 2014 there was a slight rise as the amount of fatal drownings incidents rose to 120. (Norges Livredningsselskap 2015)

In all drowning categories used by the SSB and NFH there has been a slow but steady decline in the drowning rates. The slowest decline can be seen in intentional deaths by drowning or suicides. On the other hand this is a category which is impossible to reach through drowning preventive work. The category “drownings from shore” has the most fatal drowning incidents of all categories. There have been between 65 and 90 deaths by drowning in this category every year from 1998 to 2011. In 2007 there was a drop in the numbers from 65 incidents in 2006 to 52 in 2007. This positive development has continued in recent years with the exception of 2014 when there was a slight rise in the numbers again. Looking at the statistics in ten year periods a clear decline can be seen. In 1998 to 2007 there were 723, in 1999-2008, 702 in 2000-2009, 695, in 2001-2010, 677 and in 2002-2011, 660 fatal drowning incidents in this category. The most typical victims in this category are middle age men aged 45-64 years followed by men aged 25-44 years. The

third biggest age group in this category is 65-79 year olds. A slight decline in the drowning rate can be detected in all three age groups from 1998 to 2011, interrupted by some worse years every now and then. An explaining factor for this might be warmer summers when swimming and other recreational activities in and around water increase. The most stable decline can be seen in the age group 65-79 year olds. A positive thing is that child drownings are very uncommon in this category in Norway and there have been only 3-8 fatal drowning incidents per year for children aged 0-14 years and 0-4 incidents for children aged 15-17 years from 1998 to 2011. It is also uncommon that young adults aged 18-24 years drown and there have been only 4-10 fatal incidents each year from 1998 to 2011. (Norges Livredningsselskap 2015)

The drowning statistics collected by the NFH in the form of press clippings reveal some interesting facts about the “drownings from shore” category. The most common cause of death by drowning in this category is coded as a “fall into a river or lake” which has claimed between 10 and 25 lives each year from 1998 to 2011. The second most common cause of death by drowning is coded as “while swimming” which has claimed approximately 5 to 15 lives each year from 1998 to 2011. One must remember that these drowning statistics by the NFH are not complete even though probably indicative to some extent. As an example in 1998 the NFH reported 35 deaths as drownings from shore while the official drowning statistics collected by the SSB later revealed a much higher number of 64 fatal incidents in this category. Preliminary drowning statistics are however important for guiding and motivating drowning preventive work done by the lifesaving organizations. (Norges Livredningsselskap 2015)

The third category used in collecting Norwegian drowning statistics is “drownings sea transportation”. In this category there has been a slow but steady decline in the drowning rate from 1998 to 2011. Between 1998 and 2007 there were 302 fatal incidents in this category and from 2002 to 2011 only 244. Looking at the NFH drowning statistics for this category there are two reasons for the fatal drowning incidents that tower above the rest. They are: “overboard from leisure boat” and “capsizing”, the first mentioned being the most common. A look at the age groups for this category in the SSB statistics reveal that men aged 44-64 are the most common victims in such drowning incidents followed by men aged 25-44. Women have been victims in such fatal drowning incidents only 0-2

times a year from 1998 to 2011. The Norwegian drowning statistics share many similarities with the drowning statistics in Finland, Sweden and Denmark. A typical drowning victim is a middle aged man 44-64 years old, falling into the water from a small leisure boat e.g. rowing boat or drowning while swimming. (Norges Livredningsselskap 2015) It is worth mentioning that there are differences in the total amount of fatal drowning incidents reported in the “drownings sea transportation” category between the SSB and NFH statistics. Some years the difference is quite large, up to +20 or +30 cases in favor of the NFH statistics. One can only speculate about the reasons for this but perhaps multiple reporting and differences or mistakes in coding of the drowning incident might lead to a larger number than in the official statistics published by the SSB at a later date.

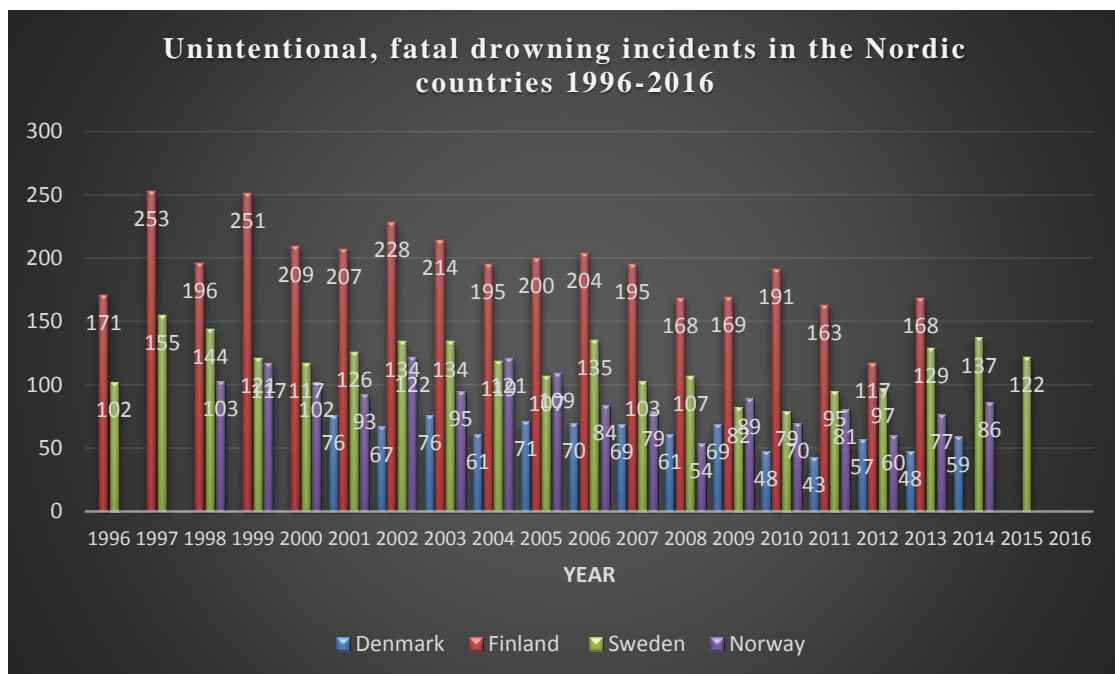


Figure 6. Amount of unintentional, fatal drowning incidents in the Nordic countries 1996-2016 (Numbers based on official drowning statistics published by: Trygfonden, SUH, SLS and SSB)

5.1.5 A typical Nordic drowning incident

Are there any similarities or general trends to be found concerning Nordic drowning incidents? Drowning risk factors are presented in the ILS – Drowning prevention strategies – A framework to reduce drowning deaths in the aquatic environment for nations/regions engaged in lifesaving from 2015 (International Life Saving Federation 2015 p. 12). These

risk factors have previously been presented and discussed in detail in chapter two of this thesis (see above p. 18-25). The ILS drowning risk factors are: gender, age, ethnicity, medical conditions and other factors. Among the “other factors” you find: being under the influence of alcohol while swimming, fishing and boating, not using personal floatation devices and poor swimming ability. In the WHO - Global Report on Drowning poor swimming ability and low awareness of water dangers are mentioned as key drowning risk factors (World Health Organization 2014 p. viii) A large part of the fatal drowning incidents in the Nordic countries are a result of one or more of the ILS and WHO drowning risk factors. The drowning incidents in the Nordic countries share many similarities.

5.1.6 Nordic drowning incidents – gender and age

A typical drowning victim in the Nordic countries is a middle aged man. In up to 80-90 % of all fatal drowning incidents the victim is male. Men have always been vastly overrepresented in the drowning statistics. A large part or 60-70 % of the victims are over 50 years of age. Long term studies of drowning incidents where age groups have been used, reveal some interesting facts. The highest drowning rates and the slowest decrease in the amount of yearly, fatal, drowning incidents can be found in the middle aged or older age groups e.g. men 45 years or more. This raises the questions: why are men and why are middle aged and older men so overrepresented in the Nordic drowning statistics?? Male risk taking behavior is at least partially to blame for this. Men seem to enjoy riskier recreational activities than women. Such activities are for example fishing and boating. Even during swimming and bathing men tend to take bigger risks e.g. swimming out into deep water, swimming in or diving into unknown waters and swimming under the influence of alcohol. This is closely connected to the fact that men often tend to underestimate the risk of drowning more than women. In a study of real versus perceived water competency in young adults by Moran et al. in 2012 the results suggested that men and women are equally skilled at estimating their water competencies. However men were more likely to underestimate the risk of drowning in water-safety related scenarios. (Moran et al. 2012 p. 122-124) Men are worse at understanding or recognizing inherent dangers than women, in general. Male behavior encourages the need to show off. This risk taking behavior can be seen fairly early in life. Peer pressure is associated with male risk taking behavior and increases the risk of drowning in both young and old.

Ingrained, indifferent, unsafe attitudes towards water safety and towards risks in water-related scenarios are a partial explanation to why Nordic, middle aged and older men drown. They do not apply with water safety regulations or recommendations and end up in trouble while swimming, fishing and boating. Typically this means going out alone, not wearing a lifejacket or being under the influence of alcohol. Many times all of the above combined. A look at Swedish and Finnish drowning statistics reveals that this problem is especially evident on smaller lakes, rivers etc. It is believed that smaller bodies of water give a false sense of security. If the lake or river etc. is familiar to the person this only adds to the problem. These unsafe attitudes are unfortunately partially inherited through generations and are therefore difficult to change in a short period of time. However water safety campaigns are believed to be effective in tackling this issue and are being used as drowning preventive instruments by the lifesaving federations in the Nordic countries. According to the SLS in Sweden the single, most effective drowning preventive measure would be a mandatory use of lifejackets during fishing and boating. It is estimated that this could save up to 30 lives each year in Sweden.

With older age comes different medical conditions that affect our physique and judgement. The most common medical conditions involved in Nordic drowning incidents are cardiovascular, pulmonary and neurological diseases. In child drownings medical conditions are seldom a contributing factor and if so often some form of neurological disease e.g. epilepsy.

5.1.7 Nordic drowning incidents – ethnicity

Ethnicity as a drowning risk factor in the Nordic countries is especially evident in child drownings. Unfortunately immigrant children from outside of Europe constitute a disproportionately large part of the Nordic child drowning statistics. In the MSB research report of child drownings in Sweden between 1998 and 2007 it is stated that immigrant children many times lack sufficient knowledge and skills when it comes to swimming and bathing. Immigrant children can end up in trouble while swimming with other children who are better swimmers than themselves. Peer pressure and not recognizing water dangers can lead them into dangerous situation with potentially disastrous outcomes. As a preventive

measure for the future it is suggested that all Swedish schools arrange swimming education and that immigrant children must be engaged in the swimming education from the start. (Myndigheten för samhällsskydd och beredskap 2010 p. 10-11 & 19-20) Proper swimming education for immigrant children irrespective of their age is very important. Immigrant children must be allowed to take part in the swimming education as soon as possible. This in turn depends almost entirely on the parents and their views and perceptions of the swimming education. The parents are gatekeepers. Changing their attitudes towards swimming education is the key to success. These attitudes are many times ingrained and have deep roots and are therefore difficult to change. Parents of immigrant children are many times unable to swim themselves. They might not see a need for swimming education. Their upbringing and religious beliefs might also affect their attitude towards swimming education. In a Nordic environment where water is all around us swimming ability can be a lifesaving skill.

5.1.8 Nordic drowning incidents – other risk factors

Almost 25 % of the drowning victims in the Nordic countries are under the influence of alcohol at the time of the drowning. Alcohol can increase risk taking behavior and impair a person's swimming ability. Alcohol increases self-confidence leading to more risk taking and an underestimation of potential hazards as well as an overestimation of one's skills. (World Health Organization 2008 p. 65) This can significantly increase the chance for a drowning incident occurring. It also decreases the chance for surviving or saving somebody else's life in a drowning incident. In a drowning incident the right decisions need to happen fast. There are numerous factors associated with the surrounding conditions that affect the amount of time there is for decision making and action in a drowning incident. These are for example: water temperature, wave conditions, fog, riptides, currents, light conditions, debris, other victims and so on. Needless to say that alcohol does not improve one's ability to make the right decisions under time pressure, stress and potentially poor conditions. Being under the influence of alcohol during swimming, fishing and boating is one thing. However the worst case scenario is being intoxicated in combination with not wearing a personal floatation device i.e. a lifejacket while fishing or boating. This greatly raises the chance for a fatal outcome in a drowning incident. For young adults and adults, consuming alcohol while swimming, bathing, fishing or boating etc.

seems to be all too common in the Nordic countries. A tragic fact in Nordic drowning statistics is that a large part of the victims drown close to shore either during short swims or while fishing or boating. Boating related, Nordic drowning accidents often involve small recreational boats e.g. a rowing boat. In addition the victim is often under the influence of alcohol and is not wearing a personal floatation device. The victim often stumbles and falls into the water or the boat capsizes with devastating consequences. Turning even a small, capsized boat around is close to impossible, especially if you are alone. Even holding on to the boat is very difficult and cold water significantly decreases one's ability to hold on or grasp. Wet clothes become heavy and adds to the problem.

Legislation concerning alcohol use and wearing personal floatation devices i.e. lifejackets especially on smaller boats while fishing or boating has been the subject of much debate in the Nordic countries for decades. To this day the legal alcohol limit while boating is still quite high and there is no mandatory use of personal floatation devices in any Nordic country that would cover all boats and water crafts. As an example the legal alcohol limit for boating is 1.0 per mille in Finland (Rajavartiolaitos 2016). In addition to this the alcohol limit does not apply to smaller boats with no engine. In other words you can be as drunk as you like while fishing from your rowing boat, not wearing a lifejacket and not risk any form of legal punishment. Lifesaving federations and other drowning preventive actors in the Nordic countries have been lobbying for lower alcohol limits in all forms of boating for years. In addition a mandatory use of personal floatation devices has also been on the agenda as well as increased surveillance especially on smaller lakes. Even though the legislation against the use of alcohol might not be effective in itself the signal it sends to coming generations is that much more important.

In Sweden the SLS has been campaigning for a mandatory use of lifejackets for years but to this day it has not yet come into force. The SLS has been trying new methods to tackle the problem by supplying lifejacket depots throughout the country where lifejackets are easily accessible and can be borrowed free of charge or rented for reasonable fee. Today 260 Swedish municipalities have a lifejacket depot. (Svenska Livräddningssällskapet 2016c)

5.2 Nordic swimming ability research

The following section will look at the level and development of swimming ability in the Nordic countries from 1996 to 2016. In 1996 the Nordic countries agreed on a definition for the term swimming ability. According to the Nordic definition of swimming ability one is able to swim when one, after being immersed in water, can swim continuously for 200 meters, of which at least 50 meters on backstroke (Suomen Uimaopetus- ja Hengenvastusliitto 2011 p. 9). To this day there is no globally accepted definition of swimming ability. The ILS has recognized the importance of swimming ability through swimming and lifesaving education in the fight against drowning on a global scale. Swimming and lifesaving education are so called secondary drowning preventive measures that aim to prevent injuries and death from happening in a drowning incident (International Life Saving Federation 2015 p. 16) The WHO also recognizes the importance of swimming ability and the teaching of water safety skills to children. Among the WHO's ten drowning preventive actions you can find teaching school children basic swimming, water safety and safe rescue skills (World Health Organization 2014 p. 18-19)

Swimming ability research in the Nordic countries has been done with a varying frequency during the past twenty years. Some Nordic countries have tested both adults and children on a more regular basis while others have tested more sporadically with a focus on children's swimming ability. Studying swimming ability research from the past twenty years reveals just like the drowning statistics many similarities but also differences between the Nordic countries. Differences can be found in the swimming ability testing procedure, in testing regularity and where the emphasis lies within the swimming education and the testing of swimming ability. Similarities can be found in several factors that affect the swimming ability e.g. age, gender, level of education, level of income and living area. Even though the term testing is used here it does not mean practical swimming ability testing. Testing in this context means researching swimming ability with surveys. Practical testing of swimming ability of e.g. all pupils in fifth grade is impossible due to practical, economical and logistical reasons. However postal surveys are often combined with practical validation tests to validate or certify the results from the surveys.

The swimming education in the Nordic countries has been developed systematically since the middle of the 20th century. The 1930s, 1940s and 1950s was a time when the Nordic

governments began to realize the extent and effect of drowning as a cause of death on a national scale. The Nordic Lifesaving Federation was founded in 1945. This was the start of a more systematic development of the swimming education in a drowning preventive context by the Nordic lifesaving federations. Concerns about the lack of competent swimming instructors was raised and instructor education programs were developed alongside the swimming education itself. Lobbying of the government and the municipalities to develop and update the swimming education began. From 1970s onwards the development took another step forward when the Nordic governments began building more indoor pools thus enabling year round swimming education. Indoor pools have played a significant role in improving the swimming education in the Nordic countries. It has increased the amount of hours spend on swimming education. Most Nordic children learn how to swim either in a communal or private swim club, in primary and secondary school or with their parents. To this day there are not enough indoor pools in the Nordic countries. This has been a constant concern of swimming education and lifesaving experts. This creates situations where some pupils have too long a distance to the closest indoor pool. This usually means less swimming education per year due to transportation fees and time restrictions. Another fact is that swimming education requires more resources than other school subjects in general. This is mostly due to entry-, transportation and instructor fees. Schools with less economic means often make reductions, cuts in their swimming education during economically challenging times. This has been seen throughout Scandinavia especially in the early 1990s when economic depression hit the Nordic municipalities hard. The global economic crisis that began in 2008 has had similar effects causing more budgetary constraints.

5.3 Swimming ability research in Finland

Finland has the most comprehensive and regular testing history of swimming ability from the past twenty years. In all tests the Nordic definition of swimming ability has been used as the benchmark. All tests of swimming ability for both adults and children in Finland have been done using postal surveys. Finland has tested adult swimming ability in 1998, 2003, 2006 and 2011. Children's swimming ability has been tested in 2000, 2004, 2006, and 2011. The tests have been done with children in the sixth grade of primary school. Adult swimming ability in Finland has had a fairly slow, but steady development towards

the better. Swimming ability among adults improved from 64 % in 1998 to 66% in 2003, declined to 64 % in 2006 and improved again to 68 % in the most recent test in 2011. Children's swimming ability in Finland improved from 67 % to 80 % during the first six years of the 21st century only to decline somewhat in 2011 to 72 %. The latest, still unofficial results from 2016 suggest a slight improvement again to 76 %.

In the beginning of the 1990s there was a severe economic depression in Finland. This led to a discontinuation of many communal swimming courses and the amount of swimming teaching in primary and secondary school was decreased. According to a study by Kurki & Anttila (1999 p. 67) there was no swimming education in 21 % of the Finnish primary schools in 1997-1998. No extensive studies had been made about swimming ability among Finnish children up until the beginning of the 21st century. The study in 1999 by Kurki & Anttila investigated swimming ability among adults and the level of the swimming education in Finnish schools, indoor pools and municipalities. This study was made as a cooperation between SUH, LIKES-research center, KTL and the Ministry of Education. LIKES is a foundation promoting exercise and public health. KTL is the national authority on public health and welfare and is nowadays known as THL. In 2000 the National Board of Education joined this cooperation and a study was launched to investigate the swimming ability among children in the sixth grade. (Kuusela 2000 p. 1-3) A similar study has been made in 2004, 2006 and 2011.

5.3.1 Swimming ability among adults in Finland

Swimming ability among Finnish adults has been studied by THL in 1998, 2003, 2006 and 2011. According to statistics published by SUH the swimming ability among adults aged 15-64 was 64 % in 1998, 66 % in 2003, 64 % in 2006 and 68 % in 2011. Looking at different age groups 15-24 year olds have the highest swimming ability, over 75 % in all studies from 1998-2011, followed by 25-34 year olds with over 70 %. The lowest or worst swimming ability is found among middle aged people from 45-54 and 55-64 year olds. Swimming ability among 45-54 year olds is under 60 % in all studies except for 2011 when there has been an increase to 65 % in this age group. Swimming ability among 55-64 year olds is approximately 50 % in all studies from 1998 to 2011. It is worth men-

tioning that there has been a slight increase in this age group since 1998 when the swimming ability was just over 40 %. Overall there has been an increase in swimming ability among Finnish men between 1998 and 2011. In 1998, 69 % of Finnish men could swim in line with the Nordic definition of swimming ability. In 2011 this number was 71 %. Among women a similar development can be seen. In 1998, 60 % of adult, Finnish women could swim according to the Nordic definition of swimming ability. In 2011 this number was 65 %. Swimming ability has improved among women over 10 % in the age groups 15-24, 35-44 and 45-54 year olds from 1998 to 2011. (Rajala & Kankaanpää 2011 p. 29-30)

The studies of adult swimming ability in Finland show that the younger generations have a better swimming ability than older generations. Several factors might explain this. With age comes physical illnesses and conditions that might worsen one's ability to swim. In the 1970s the development of the indoor pool network in the country started. At the same time the primary and secondary schools began increasing the amount of swimming teaching. (Rajala & Kankaanpää 2011 p. 39)

Instrumental in this development was The Finnish Swimming Teaching and Lifesaving Federation (SUH) founded in 1956. The first fifteen years after the SUH was founded the focus was on building a strong foundation and making guidelines for future work. Emphasis was put on developing the swimming teaching education and the training of swim instructors. SUH wanted to increase swimming ability among the Finnish population in order to decrease the amount of fatal drowning incidents. The network of indoor pools grew larger in the 1970s and 80s. The conditions and opportunities for effective swimming teaching in the Finnish municipalities and schools improved. The SUH was involved in developing an effective model for swimming teaching in the local indoor pools. The SUH recommended that a trained swimming instructor should be in charge of the swimming teaching and supervision of the pupils in all municipalities that had an indoor pool. Unfortunately this recommendation was not followed by a large number of the local indoor pools. (Ilmanen 2005 p. 113 & 133)

The older age groups did not have the same amount of swimming teaching in school or the same opportunity to use indoor pools when they were younger. Socioeconomic factors

also seem to play a role in swimming ability as adults with a higher education in general also have a better swimming ability. There are also differences in swimming ability between different parts of the country. The worst swimming ability among adults can be found in Northern Finland. This might be explained by a smaller number of indoor pools and therefore a long distance to the closest indoor pool. Natural waters i.e. lakes, rivers, streams etc. are colder in the North. Cold water does not attract people to swim like warmer water does thus decreasing the motivation, opportunities and hours spent learning how to swim. (Rajala & Kankaanpää 2011 p. 39)

5.3.2 Swimming ability among children in Finland

In Finland swimming education is the only subject among physical education subjects that is specifically mentioned in the national curriculum by the Finnish National Board of Education or Opetushallitus for primary and secondary school. However there is no exact distance a pupil must be able to cover or exact skill that must be learnt in order to be considered “able to swim”. This is true even for the last grades in secondary school 7-9. The national curriculum for 7-9 grade updated in 2014 states that the goals for the swimming education is to strengthen swimming and water safety skills so that the pupil is able to swim, has sufficient self-rescue skills and is able to save somebody else from the water. (Opetushallitus 2014 p.148, 233 & 433) Swimming ability among children has been studied in 2000, 2004, 2006 and 2011 as a cooperation between SUH, LIKES and the Finnish National Board of Education. The published research reports from these studies in 2004, 2006 and 2011 have included a section provided by the national authority on health and welfare THL on swimming ability among adults (see above).

The study in the year of 2000 on swimming ability among children in Finland wanted to know: 1) how many pupils in the sixth grade can swim in line with the Nordic definition of swimming ability? 2) what is the difference between reported swimming ability and actual swimming ability? 3) to what extent does swimming education given by parents, in school or during communal courses affect swimming ability? The study was done with a postal survey sent to 640 randomly selected primary schools, including over 10 000 pupils. The response rate was 75 % including 7646 pupils. According to this survey 67 % of the Finnish primary school pupils in the sixth grade could swim in line with the Nordic

definition of swimming ability. A practical validation test suggested that the actual swimming ability was higher, 92 % for the boys and 88 % for the girls. Over 50 % of the pupils reported that their parents had taught them how to swim. Approximately 25 % had learnt how to swim during a communal swimming course. Only 6 % said that they had learnt how to swim in school. Almost 80 % of the pupils had learnt how to swim as a combination of parental teaching and a swimming course. The survey also revealed that 82 % of the Finnish primary schools give swimming education to their pupils. In 80 % of these schools the pupils could swim in line with the Nordic definition by the end of the sixth grade. In schools who did not give swimming education only 66 % could swim in line with the Nordic definition on swimming ability. (Kuusela 2000 p. 1-3 & 4-10)

The study in 2000 had a section where teachers got the opportunity to express their thoughts and concerns about the swimming education at their school. A common concern was that the amount of swimming teaching was too low, often as little as 1-2 times year. Some schools had no structured swimming teaching at all even though the pupils went to the local indoor pool. Another common problem was that there were too many pupils in the groups and the teaching was therefore inadequate or unsafe. Some schools had made the decision to concentrate the swimming education to the first two years of primary school. There was little continuity and almost no monitoring of the progress of the pupils. Suggestions were made that Finnish municipalities should be forced to arrange swimming teaching for all preschool children. This would serve as a foundation for continued swimming teaching in primary school leading to better results in swimming ability among Finnish school children. (Kuusela 2000 p. 11)

The next study on swimming ability among children in Finland was made in 2004. This study included 588 randomly chosen primary schools. The study was made as a postal survey. The response rate was 76 %. According to the survey the swimming ability among Finnish primary school children had risen from 67 % in the year of 2000 to 78 % for girls and 75 % for boys in 2004. Over 50 % had learnt how swim with their parents or relatives. Approximately 20 % had learnt how to swim during a swimming course. Under 10 % had learnt how to swim in school. A large part or 88 % of the primary schools arranged swimming education (79 % in 1997, 82 % in 2000), 74 % also during the sixth grade. The research questions were the same as in the year 2000 survey (see above). A practical

validation test suggested that the actual swimming ability in 2004 was, 100 % for girls and 94 % for boys. (Kurki & Rajala 2004 p. 3-4 & 11-22)

In 2006 the next postal survey on swimming ability among Finnish primary school children in the sixth grade was made. Again it was made as a cooperation between SUH, LIKED and the National Board of Education. The questionnaire was the same as in 2000 and 2004. The survey included 570 primary schools and approximately 10 000 school children. The response rate was 64 %. A positive development was that in 2006, 90 % of the primary schools in Finland arranged swimming education for their pupils compared to 88 % in 2004. Almost one fifth or 18 % of the primary schools had no swimming education in the sixth grade in. The biggest reason for not having swimming education at all was that these schools could not afford the education and the transport fees. The swimming ability both for the boys and the girls in sixth grade was 80 % in 2006 compared to 67 % in 2000, 78 % for the girls and 75 % for the boys in 2004. Fourteen percent of the teachers had tested the swimming ability of the pupils with a practical swimming test. These test results suggested that the swimming ability among pupils in the sixth grade in 2006 was actually 90 %. (Hakamäki & Rajala 2006 p. 7-17)

The most recent study of swimming ability among Finnish primary school children in the sixth grade was made in the 2011. The study included 300 randomly selected schools and approximately 5300 pupils. The response rate was 87 %. The questionnaire in the 2011 study was different from the one used in 2000, 2004 and 2006. Still the goal was to be able to compare the results with the prior surveys. One key difference in the 2011 survey was that the pupils answered the research questions individually thus decreasing the risk of group, peer pressure affecting the results. The results from the 2011 survey revealed a swimming ability of 72 % among Finnish school children in the sixth grade. This is a worse result than in 2004 and 2006. However one has to consider that the survey questionnaire was different as well as the manner in which the answers were given. A positive development was that in 2011, 95 % of the primary schools in the country arranged swimming education for their pupils. Every pupil in primary school should get swimming education and the progress of the swimming ability should be monitored. This would secure the development of the swimming ability throughout primary and secondary school. There needs to be a continued and more accurate investigation of the swimming education

in Finnish municipalities and how swimming ability is monitored on a local level. Primary school is an ideal time to learn how to swim. Only 10 % of the children reach the Nordic definition as late as secondary school. The vast majority are able to swim in line with the Nordic definition before the end of primary school. Only 25 % of the children swim more than 2-3 times a month after the age of 12, 45 % swim less than once a month and 10 % do not swim at all. Parents have a key role in motivating their children to swim regularly. This should start early by frequent visits to the indoor pools until the children can swim independently, on their own. (Rajala & Kankaanpää 2011 p. 6-17 & 26-28)

5.4 Swimming ability research in Sweden

In Swedish drowning preventive work there has been a strong focus on preventing child drownings. This is evident when looking at the history of swimming ability research between 1996 and 2016. Children's swimming ability has been tested four times in past twenty years in 2000, 2003, 2005 and 2010. Adult swimming ability in Sweden has been researched three times in the past twenty years in 2007, 2012 and 2014. In all tests of both adults and children the Nordic definition of swimming ability has been used. Tests of swimming ability for both adults and children in Sweden have been done using postal surveys. The swimming ability among Swedish children in grades 4-6 in primary school in 2000 was 86 %. In 2003 the swimming ability among Swedish children in the fifth grade was 94 % for pupils in communal schools and 96 % for pupils in private schools. The 2003 survey had its background in concerns about drowning being the third most common cause of death among children and adolescents in Sweden. Swimming ability, increased water safety and supervision were mentioned as the most important drowning preventive measures for the future. In 2005 the swimming ability among children in the fifth grade was 88 % and in 2010, 90 %. Adult swimming ability was 76 % in 2007, 73 % in 2012 and 78 % in 2014. Just like in Finland the worst swimming ability can be found in the middle aged and older age groups. In the 2012 research 79 % of 40-49 year olds, 68 % of the 50-59, and 57 % of the +60 year olds could swim according to the Nordic definition of swimming ability.

Sweden was struck by an economic depression during the 1990s and just like in Finland cut-backs were made in governmental subventions to the Swedish municipalities. This in

turn meant cut-backs and reductions in money spent on swimming education in the Swedish schools. In 1993 the Swedish Lifesaving Federation (SLS) founded a lifesaving school for children. This was meant to support the swimming education given by the primary and secondary schools. The lifesaving school for children is a booklet made by the SLS including water safety and lifesaving material that can be used by the swimming instructors in school. Studies have shown that over 86 % of the Swedish schools use this material as an addition to their swimming education. Studies made by the SLS during the 1990s revealed that only 60 % of the Swedish schools arranged swimming education for their pupils. (Kuusela 2000 p. 3)

5.4.1 Swimming ability among children in Sweden

The SLS has since 1993 in cooperation with the SIFO-research center made surveys on swimming ability and lifesaving skills among Swedish school children. The level of the swimming education in the schools has also been investigated. These studies have been made using phone interviews with 200 to 300 parents of children in grades one to nine. According to these studies the swimming ability among Swedish school children declined slightly from 1993 to 2000. In the year 2000, 86 % of the Swedish school children in grade 4-6 could swim in line with the Nordic definition of swimming ability. (Kuusela 2000 p. 3-4)

In 2003 The National Board of Education in Sweden, Skolverket decided to do a survey on swimming ability and the ability to handle emergency situations around water. The survey report was published in 2004. The survey targeted pupils who completed their fifth school year. The study was done using a postal survey and included both communal and private schools. The survey had its background in concerns about drowning being the third most common cause of death among children and adolescents in Sweden. Swimming ability, increased water safety and supervision were mentioned as the most important drowning preventive measures for the future. In the study concerns were raised about the varying definition of swimming ability in the country. A large part or 64 % of the communal schools and 67 % of the private schools used the Nordic definition of swimming ability as their definition of whether a pupil could swim or not. The research report concluded that it is not reasonable to demand that the pupils must reach every goal

in every subject set by the curriculum. However the people in charge of the schools must be able to provide the means for reaching these goals. The study revealed that 94 % of the pupils in the communal schools and 96 % of the pupils in the private schools were able to swim by the end of fifth grade. However one must consider that not all schools required the pupil to swim in line with the Nordic definition of swimming ability. (Lindmark 2004 p. 1-4)

In the 2003 survey by Skolverket the schools had the chance to comment on why some pupils do not reach the goal set for swimming ability. The most common causes for a pupil not being able to swim were: religious, cultural, ethnic reasons (37%), medical and social reasons (44 %) and economical or organizational reasons (19%). Religious, cultural and ethnic reasons were e.g. children who were not allowed to swim by their parents, children who were not used to water and children with an immigrant background. Medical and social reasons were e.g. physical and mental illnesses, allergies, disabilities, fear and obesity. Economical or organizational reasons were e.g. a shortage of teachers and swim instructors, a long distance to the closest indoor pool, resistance among the pupils and high costs for entry fees and transport. As a conclusion to the survey report Skolverket emphasized that there is no nationally accepted definition of swimming ability and that it is up to the schools to decide what the proper definition of swimming ability is. (Lindmark 2004 p. 7-12)

In the fall of 2004 the Swedish Swimming Federation (SSF) launched a study on swimming ability among Swedish school children in grades one to five. The study was called Vattenprovet and was meant to go on from the fall of 2004 to the summer of 2007. It began with a pilot study of the swimming ability among pupils in the Swedish municipality Upplands Väsby. The idea was to create a platform, a practical test for swimming ability that could be used by any Swedish municipality to test the swimming ability among its pupils. Swimming ability in this study was defined in line with the Nordic definition of swimming ability. The pilot study revealed that 87.7 % of the pupils in grades one to five can be considered, able to swim. A large part or 88 % of the pupils in grade five are able to swim, 81 % in grades four to five, 60 % in grade three and 28 % in grades one to three. (Sparrman 2005 p. 15 & 28-31)

In 2006 the National Board of Education in Sweden, Skolverket was commissioned by the Swedish government to clarify the goals for swimming ability in the fifth grade as well as suggest how swimming ability on a national level could be monitored in the future. This resulted in a clarification of the goals for swimming ability in 2007. The new guidelines for swimming ability by the end of fifth grade stated that: the pupil should be used to water, feel safe in water, be able to swim 200 meter of which 50 meters on backstroke, be able to handle emergency situations around water and have basic knowledge of bathing, boating and ice-conditions. (Skolverket 2010 p. 1-5)

In 2010 Skolverket launched a follow-up survey on swimming ability in the fifth grade. The study was made with a postal survey to 500 randomly chosen schools, 300 communal and 200 private schools. The survey questionnaire included ten questions and was made in cooperation with the Swedish Lifesaving Federation, SLS. The response rate was 74.8 %. It is worth mentioning that the report by Skolverket from 2004 is not comparable with the 2010 report due to different definitions of swimming ability. The 2010 report revealed that under 10 % of Swedish children in fifth grade do not achieve a swimming ability in line with the Nordic definition. The most common reasons for not being able to swim mentioned in the 2010 report are: fear, cultural reasons, not taking part in swimming education, physical disabilities and religious reasons. It is common among immigrant children to be unaccustomed to water. This is many times a result of their parents not being able to swim or being uncomfortable in and around water and passing this on to their children. The 2010 report also revealed the importance of starting swimming education early. A large part of the schools or 75 % start the swimming education before third grade. Almost one fourth or 25 % start the swimming education during preschool. In 50 % of the schools that start the swimming education in first grade, all pupils reach the goals set for swimming ability in accordance with the Nordic definition. This proves how important it is to start swimming education early. (Skolverket 2010 p. 7-10) Eight out of ten Swedish schools arrange additional swimming education, free of charge for pupils who do not meet the criteria for swimming ability set by the curriculum (Skolverket 2010 p. 11-12)

In the fall of 2011 the Swedish national curriculum for primary and secondary school was revised. In connections with this the SLS published its view and interpretation of the new curriculum in 2011 to help teachers achieve the goals set by the national curriculum. The

interpretation by the SLS was divided into three categories: grades 1-3, grades 4-6 and grades 7-9. In the first category the SLS advised the teachers to focus on games and movements in water thus familiarizing the children with water in a positive, motivating atmosphere. In the second category the SLS advised the teachers to focus on reaching a swimming ability in line with the Nordic definition of swimming ability and learning lifesaving skills. In the last category focus should be on improving swimming techniques and lifesaving skills. (Svenska Livräddningssällskapet 2011)

5.4.2 Swimming ability among adults in Sweden

Studies on swimming ability among Swedish adults are few and far between. The SIFO research center has made a study on swimming ability among adults in 1981. This study included persons over 18 years of age. The study implied that 71 % of the Swedish adult population could swim over 200 meters. (Sparrman 2005 p. 14) In 2007 the SLS conducted a survey on attitudes towards water safety among the adult population. This survey included questions on perceived swimming ability among adults. The 2007 survey revealed that 76 % of the adult, Swedish population can swim according to the Nordic definition of swimming ability. One out ten adults were not able to swim in 2007. In 2012 the SLS made a follow-up study to the 2007 study in cooperation with the Reagera research company. This study included 1500, 19-70 year olds Swedish citizens. The study was made as a web based questionnaire. The results in 2012 were similar to the ones received in 2007. The 2012 study revealed that 73 % of the adult population can swim according to the Nordic definition on swimming ability. The study showed that three out of ten adults in Sweden are not sure if they can swim 200 meters of which 50 meters on backstroke. This means that almost 2 million adults in Sweden are unsure of their swimming ability. According to the Nordic definition of swimming ability these adults could therefore be considered “not able to swim”. The worst swimming ability could be found in the age groups 40-49 year olds (79%), 50-59 year olds (68%), 60+ year olds (57%). (Svenska Livräddningssällskapet 2012a)

The next study on swimming ability among adults was made by the SLS in 2014. This study was made in cooperation with Novus research company and included interviews with 4674, 18-79 year old Swedish citizens. The study revealed a positive development as the swimming ability among adults had risen to 78 % since the last study in 2012. The

2014 study revealed large variations in swimming ability between different parts of the country. The Northern most counties e.g. Jämtland (65%) had almost 20 % lower swimming ability among adults compared to counties in more southern parts of Sweden e.g. Stockholms län (82%). (Svenska Livräddningssällskapet 2014a)

5.5 Swimming ability research in Denmark

The amount of swimming ability research in Denmark during the past twenty years is quite modest. Two studies of swimming ability including both adults and children have been made. The first study took place in 2007 and the second in 2014. Both studies were comprehensive and included three separate sections. One section investigated adult swimming ability. Children's swimming ability was investigated in two sections. The first section surveyed parental views on children's swimming ability and the second the children's own perception of their swimming ability. Both studies were made using postal surveys, phone interviews and web-based questionnaires. In 2007 phone interviews and in 2014 postal surveys was the most common research instrument. In both the 2007 and 2014 study the Nordic definition of swimming ability was used as the benchmark for swimming ability. In 2007, 66-67 % and in 2014, 73 % of the Danish adults could swim. Swimming ability among Danish adults has in other words improved slightly between 2007 and 2014.

Children's swimming ability in 2007 was 79 %. In 2014 children's swimming ability was 51 % for 11 year olds, 59 % for 12, 64 % for 13 and 67 % for 14 year old children. These results reflect the children's own perception of their swimming ability just like in other Nordic swimming ability research. Comparing children's swimming ability in 2007 and 2014 is difficult since the research group in 2007 consisted of children aged 11-12 and in 2014 the methodology was different and the results were reported separately for all ages from 11-14. However there seems to be a slight decline in children's swimming ability in Denmark between 2007 and 2014. Only 51 % of the 11 year olds and 59 % of the 12 year olds could swim in 2014. The amount of swimming education in the Danish schools has decreased between 2007 and 2014.

5.5.1 Swimming ability among adults in Demark 2007

The first section in the 2007 study of swimming ability among the Danish people was a study of the general public i.e. adults over 18 years of age and consisted of 1000 phone interviews. The group that was researched consisted of 49 % men and 51 % women. The research questions were made in cooperation with the Danish swimming federation i.e. Dansk Svømmeunion and the Epinion Capacent research company. The study revealed that 95 % of the Danish adult population thinks it is important or very important to know how to swim. This fact correlated with the level of education. The higher the education of the person the more important he or she perceived swimming ability to be. The same was true for individuals that had received swimming education in school. The ones who had received swimming education in school perceived swimming ability to be more important than the ones who had not received swimming education in school. Almost everyone or 96 % of the Danish adults thought that it is important or very important that you are able to save somebody from drowning. (Dansk Svømmeunion 2007 p. 13-15)

An alarming fact revealed by the study was that 34 % of the Danish, adult population in 2007 could not be considered, “able to swim” according to the Nordic definition of swimming ability. This despite the fact that 79 % of the adult population perceived themselves as good swimmers. The Danish swimming federation uses the Nordic definition of swimming ability as their standard when measuring swimming ability. A large part or 67 % of the population said that they are able to swim more than 200 meters, 27 % said that they are able to swim more than a 1000 meters. The swimming ability among Danish adults in 2007 was 67 %. General trends revealed by the study were that men are more familiar with water than women, younger generations are more familiar with water, safer and better swimmers than older generations. The income level, the level of education and the amount of swimming education received in school correlated with being a better, safer swimmer. (Dansk Svømmeunion 2007 p. 15-16 & 34)

Half of the Danish population or 50 % learn to swim between the ages of 7-10. Almost everybody or 96 % learn to swim before the age of sixteen. Here of course learning to swim should not be confused with swimming ability in line with the Nordic definition. Over half or 53 % learn to swim in an indoor pool, 33 % in a lake or in the sea. Younger

generations learn to swim earlier in life than older generations did. According to the study it is more and more common that younger generations learn how to swim in indoor pools. Concerns have been raised that this might decrease the swimming performance in open or choppy water over time. Over a third or 34 % of the population learn to swim in school, 32 % are taught by their parents and 22 % learn how to swim in a swim club. Two out of three or 66 % of Danish adults have received swimming education in school, 33 % have not. Again the younger generations have to a larger extent received swimming education in school compared to the older generations. The study also revealed that 46 % of the population do not know where or by whom they can receive swimming or lifesaving education. (Dansk Svømmeunion 2007 p. 40-42 & 46)

5.5.2 Swimming ability among children in Denmark 2007

The second section in the 2007 survey was a study of parental views and opinions. The parental study wanted to reveal the parent's views on: their children's familiarity with water, swimming ability and lifesaving skills, children's actual skills and who according to the parents is responsible for arranging swimming education in the Danish society. This study was made with 500 parents to children aged 0-16 years. Fifty-eight percent of the parents were women, 42 % were men. All parents in this study shared the view that it is important that the child is accustomed to water. Likewise all parents thought that it is important that their child or children learn how to swim. A large part or 81 % thought that it is important for the children to receive swimming education in school. Almost ninety or 88 % of the parents thought that their children must learn how to rescue somebody else from the water. A large part or 74 % thought that the schools should be responsible for teaching the children lifesaving skills. According to 76 % of the parents their children were able to swim. (Dansk Svømmeunion 2007 p. 48-52)

The last section in the 2007 study was a study where 615 randomly chosen, Danish children aged 11-12 were interviewed about their swimming ability, water safety skills and attitudes towards water safety. The survey group was chosen from a sample of 1200 children. The children were in grades four (9%), five (44%), six (46 %) and seven (1%). Fifty percent were girls and fifty percent were boys. The study was made with both a postal survey and a web based questionnaire. The children's parents were sent both the postal

survey and instructions on how to answer the web based section. The response rate was 51 %. The swimming ability among Danish children aged 11-12 was 79 % in 2007 when the Nordic definition of swimming ability is used as the benchmark. The survey revealed that 89 % of the children in the survey group had received swimming education in school. Almost all children in the survey group or 97 % thought that swimming ability is an important skill. A large part or 68 % wished that they were better swimmers. Especially children who had not received swimming education in school wished that they were better swimmers. Almost half or 45 % had learnt to swim in school, 44% in a swim club and 40 % with their parents. A general trend was that a larger percentage of better swimmers were found in the higher grades of primary school among children who had received swimming education in school or in a swim club. (Dansk Svømmeunion 2007 p. 54-59 & 62) A large number or 86 % of the children felt safe in shallow water but only 50 % felt safe in deep water. To feel unsafe in deep water was more common among children in the lower grades and among those who had not received swimming education in school or in a swim club. Over half or 51 % said that they are worse swimmers in open or choppy water e.g. the sea than in an indoor pool. The survey also revealed that 28 % of the Danish children swam less than once a month. Children who had not received swimming education in school swam less frequently than children who had. (Dansk Svømmeunion 2007 p. 54-55 & 66-69)

5.5.3 Swimming ability among adults in Demark 2014

In 2014 a follow-up study to the 2007 study was made. This was the first study of swimming ability in Denmark since 2007. The study was made as a cooperation between the Danish swimming federation i.e. Dansk Svømmeunion, Trygfonden and the YouGov research company. Trygfonden is the Danish, national authority on health and safety. The study in 2014 consisted just like in 2007 of three separate sections. The sections were the same as in 2007 (see above). This time however the third section studied children aged 7-14. The research in 2014 wanted to study swimming ability, lifesaving skills and attitudes towards swimming in Denmark. The first section was again a study of Danish adults aged 18-74. It consisted of 3208 interviews. Almost a third or 31 % of the adults in the study had children aged 5-24. These children were the basis for the second section of the study which investigated the parent's views and opinions on their children's familiarity

with water, their swimming ability and lifesaving skills. The second section of the study also wanted to reveal the parent's opinions on the swimming education and who in their mind should be responsible for arranging swimming education. (Dansk Svømmeunion 2014 p. 1-3)

The results in 2014 showed that 91 % of the Danish, adult population aged 18-74 considered swimming ability to be an important skill. In 2007 this number was 95 %. Among 18-34 year olds this number had dropped from 94 % in 2007 to 86 % in 2014. There were significant differences between men and women in attitudes towards the importance of swimming ability. Almost two thirds or 63 % of the adult, Danish women thought that swimming ability is very important. Only 50 % of the adult, Danish men shared this opinion. (Dansk Svømmeunion 2014 p.4-5)

In 2014 the swimming ability among Danish adults was 73 % compared to 67 % in 2007. Twenty-seven percent of the Danish adults aged 18-74 years could not swim 200 meters and could therefore not be considered able to swim. This despite the fact that 90 % of the Danish adults claimed they can swim over 200 meters. If the entire Danish population is examined without using age groups the swimming ability in 2014 was only 51 %, 35 % were not able to swim and 14 % were uncertain of their swimming ability. (Dansk Svømmeunion 2014 p.7-8)

Eighteen percent of Danish adults who consider themselves to be poor swimmers, swim out into deep water while swimming at the beach in the summer months. This is more common behavior among men than among women. Forty percent of the Danish adults have learnt to swim in line with the Nordic definition of swimming ability in school. According to the 2014 study only 35 % of the 18-74 year old, Danish adults who learnt to swim in school, were still able to swim over 200 meters at the time of the study. The ones who had learnt to swim in a swim club had a better swimming ability as adults. Forty-six percent of the adults who had learnt to swim between the ages of 7-10 were still able to swim. Thirty-one percent of the ones who had learnt to swim between the ages 4-6 were still able to swim. Only 12 % of the ones who had learnt to swim between the ages 11-14 could still swim 200 meters. An alarming fact revealed by the 2014 study was that 62 % of the Danish men considered themselves to be excellent swimmers. However 7 %

of these men could not be considered able to swim. It seems as if Danish men overestimated their swimming ability more than women. (Dansk Svømmeunion 2014 p. 16-18 & 26-28)

The 2014 study also looked at differences in swimming ability between different age groups of the Danish population. In the age group 18-34 year olds the swimming ability in 2014 was 57 %, 27 % were not able to swim and 16 % were uncertain. In the age group 35-49 year olds 60 % were able to swim, 26 % were not and 14 % were uncertain. In the age group 50-64 year olds 45 % were able to swim, 42 % were not and 13 % were uncertain. In the last age group 65-74 year olds only 34 % were able to swim, 56 % were not and 10 % were uncertain. The swimming ability among the Danish population seems to decrease with age. There were differences between men and women in swimming ability in 2014. Over half or 56 % of Danish, adult men were able to swim, 32 % were not, 13 % were uncertain. Only 47 % of Danish, adult women were able to swim, 38 % were not and 15 % were uncertain. (Dansk Svømmeunion 2014 p. 8-9)

In the 2014 study the adult respondents were asked if they had ever suffered a near-drowning. Out of 3208 respondents 22 % had come close to drowning on at least one occasion. There was almost no difference between men and women as 21 % of the men and 23 % of the women had suffered a near-drowning. The researchers also looked at the correlation between considering oneself to be a good or bad swimmer and the amount of near-drowning incidents. Concerning men there was no significant difference in the amount of near-drowning incidents between good and bad swimmers. For the women however there was. Twenty-nine percent of the women who considered themselves bad swimmers had suffered a near-drowning incident when only 16 % of the good, female swimmers had. This led the researchers to believe that among Danish women poor swimming ability increases the risk for suffering a near-drowning. (Dansk Svømmeunion 2014 p. 20)

The researchers were also interested in, in what circumstances the near-drowning incidents had occurred. In 21 % of the near-drowning incidents there had been either strong currents, a riptide or waves as a contributing factor. In 18 % of the incidents something unexpected had happened e.g. the victim had panicked or lost orientation in the water. In

9 % of the incidents a contributing factor was that the water was deep and the victim could not reach the bottom. In 8 % of the cases the near-drowning incident occurred during some form of game in the water where the victim was held under the surface. In 6 % of the incidents the victim had swam to far from shore and could not make it back. (Dansk Svømmeunion 2014 p. 21)

5.5.4 Swimming ability among children in Demark 2014

The second section in the 2014 research was a study of parent's views and opinions on their children's familiarity with water, their swimming ability and lifesaving skills. The study also looked at the parent's opinions about the swimming education and who in their mind is responsible for arranging swimming education. Almost all parents in the study or 94 % considered swimming ability to be a very important or important skill. Women to a slightly larger extent than men. Over half or 51 % of the parents thought that school is the best place to learn how to swim. The second best place according to the parents is a swim club. Women were slightly more in favor of swim clubs than men. (Dansk Svømmeunion 2014 p. 30 & 32-34)

The last or third section in the 2014 research was a study of swimming ability, self-rescue and lifesaving skills among Danish children aged 7-14. Altogether 1661 children took part in the survey and over 200 children represented every year between 7 and 14. Even though the children had some assistance from their parents in answering the survey questions the idea was that the answers should reflect the children's own views on their swimming ability and lifesaving skills. The study revealed that most Danish children learn to swim between the ages of 8-10 years. However proper swimming ability in line with the Nordic definition of swimming ability is reached somewhat later. Eighteen percent of the eight year olds can swim over 200 meters, 36 % of the nine year olds, 48 % of the ten year olds, 51 % of the eleven year olds, 59 % of the twelve year olds, 64 % of the thirteen year olds and 67 % of the fourteen year olds. It is clear that a swimming ability of over 200 meters is more common among the older children. In the 2014 survey a comparison was made with the study from 2007 concerning 11-12 year old children. This was the age group studied in the 2007 survey. The comparison shows a slight reduction in swimming ability among Danish children aged 11-12 years from 2007 to 2014. The percentage of

children who can swim between 200-500 meters is exactly the same 21 % in 2007 and 2014. The percentage of children who can swim between 501-1000 meters has declined from 19 % in 2007 to 15 % in 2014. The percentage of children who can swim over 1000 meters has declined from 29 % in 2007 to 18 % in 2014. However the researchers point out that one must be careful in making conclusions based on these facts as the studies in 2007 and 2014 were somewhat different in their methodology. (Dansk Svømmeunion 2014 p. 40-42)

According to the 2014 study there had been a reduction in the amount of swimming education in the Danish schools since 2007. The reduction was particularly significant in the lower grades of primary school. Only 2 % of the seven year olds, 6 % of the eight year olds and 11 % of the nine year old pupils had received swimming education in 2014. A large part of the Danish children received swimming education in school in 2014 at the age of ten (23 %) or eleven (31 %). After the age of eleven the amount of swimming education started to decline again. The 2014 study revealed that only 21 % of the twelve year olds, 15 % of the thirteen year olds and 21 % of the fourteen year old children had learnt to swim in school. These are the children that should have received swimming education in school already. A large part of the Danish children or 40 % learn to swim in swim clubs or in their spare time. These children are to a higher degree able to swim in line the Nordic definition of swimming ability compared to children who learn to swim in school or in other places. (Dansk Svømmeunion 2014 p. 47 & 49-50) One of the key aspects of the 2014 study was to figure out the best place for children to learn how to swim. The study revealed that approximately 50 % of the general public (first section in the study) and the parents (second section of the study) thought that school is the best place for children to learn how to swim. (Dansk Svømmeunion 2014 p. 53 & 55)

As a conclusion to the 2014 study the researchers stated that swimming ability for the Danish population in 2014 was 51 % when not using age groups. Swimming ability among the Danish population declines with age. This might be explained by a worsened individual swimming ability due to e.g. a worsened physique, an illness, the lack of practice or by the fact that the population in general are better swimmers than before. Swimming ability seems to be affected by a few factors: age, sex, the level of education and your parent's level of swimming ability. As an example someone under 50 years of age

with a higher education is more likely to be able to swim than someone over 50 with a lower education. Men are slightly better swimmers than women in general. An important finding is that swimming ability is also partially “inherited”. If your mother or father is able to swim there is a bigger possibility that you are also able to swim. The amount of swimming education in the Danish schools has declined compared to 2007. Children primarily learn to swim in swim clubs. This is due to the fact that swimming education in the Danish schools in general is arranged from the 4th grade and onwards. This means that many children learn to swim before swimming education is arranged in school. The children who learn to swim in swim clubs are better swimmers in general. However there are regional differences and children who live in the capital area have better access to swim clubs than children in other parts of the country. If swimming education in school starts as late as in the fourth grade and the hours spent on swimming education keeps declining then there is a real danger of creating a large group of children with a poor swimming ability. This development could create many good swimmers but also many bad swimmers at the same time. This highlights the importance of a school system that can provide swimming education to all pupils starting during the first school years and going on all the way to the end of secondary school. (Dansk Svømmeunion 2014 p. 60)

5.6 Swimming ability research in Norway

In the 1980s the Norwegian School of Sport Sciences (NSSS), the Norwegian Swimming Federation (NSF) and the Norwegian Life Saving Society (NLS) agreed on eight fundamental skills that one needs to master in order to be considered “able to swim”. These skills were meant to be the foundation to swimming ability, self-rescue and feeling safe in the water. The skills included were jumping/diving into deep water, surface diving and swimming underwater, changing position from vertical to horizontal, learning two rudimentary strokes (one on the front and one on the back). The skills also included relaxed breathing coordinated to the demands of the stroke, rolling from front to back and reversing, turning left and right both on the front and on the back, and floating with the least amount of movement. The skills included no requirement of being able to swim a fixed distance. Based on these skills a test for swimming ability to be used in the Norwegian

schools was created. The test was: dive into deep water, swim 12.5 meters on your stomach, change direction, swim back 2-3 meters towards the starting point, stop, float for 30 seconds, swim backstroke to the finish. (Utdanningsdirektoratet 2008 p. 18-19 & 34)

5.6.1 Swimming ability among children in Norway

The swimming ability among Norwegian children in the fifth grade of primary school has been researched three times since the early 21st century: in 2003, 2009 and 2013. The swimming ability among Norwegian children in the fifth grade was 50 % in 2003 (MMI 2003 p. 65), 49 % in 2009 (Synovate 2009 p. 16) and 53 % in 2013 (Ipsos MMI 2013 p. 19). The Norwegian school curriculums for primary and secondary school did not until 2015 include a fixed distance the pupil has to be able to cover in order to be considered “able to swim”. The focus has been on giving the children a more comprehensive set of water skills thus striving to create swimming ability and self-rescue skills in both calm and choppy, warm and cold water.

The 2003 study of swimming ability among Norwegian children in the fifth grade in primary school was made by the Market and Media Institute (MMI) for the NSF and the Norwegian Society for Sea Rescue (NSSR). The study was made using a postal survey and included 1210 pupils and 86 teachers from 86 schools (87 % response rate) (MMI 2003 p. 2). The 2009 study was made by the Synovate research company for the NSF and the NSSR. The study was made using a postal survey and included 2807 pupils and 163 teachers from 163 schools (82% response rate) (Synovate 2009 p. 3). The 2013 study was made by the Ipsos MMI research company for the Gjensidige Foundation and the NSF. The Gjensidige Foundation is the largest foundation in Norway and it contributes to and finances socially beneficial causes with focus on health and safety (www.gjensidigestiftelsen.no). The study was made using a postal and web based survey and included 1686 pupils and 121 teachers from 121 schools (54% response rate) (Ipsos MMI 2013 p. 4-5 & 7). All three studies included two sections of survey questions, one for the pupils and one for the teachers.

The amount of swimming education provided by Norwegian primary schools for children in the fifth grade has varied from 2003 to 2013. In 2003, 46 % of the children in the fifth grade reported receiving swimming education while 76 % of the teachers reported teaching swimming education (MMI 2003 p. 5 & 43). The same numbers for 2009 were 57 % for the children and 75 % for the teachers and only 43 % and 71 % in 2013 (Synovate 2009 p. 6 & 34) and (Ipsos MMI 2013 p. 9 & 40). However one must remember that swimming education in the Nordic countries is often concentrated to the first four years of primary school especially the third and fourth grade. There were large regional differences in the amount of swimming education provided. The capital, Oslo area had by far the least amount of swimming education in 2013, only 12% compared to Middle and Northern Norway where over 70% of the pupils in the fifth grade received swimming education. The hours spent on swimming education in the fifth grade had increased since 2003. In 2013, 34 % of the pupils in fifth grade had four hours of swimming education per month compared to only 15 % in 2003 and 30 % in 2009. Fifty-six percent had between two and four hours of swimming education per month in 2013. In 2003, 64 % of the pupils in fifth grade thought they had too little swimming education in school. In 2009 this number had declined to 52 % and in 2013 to 41 %. (Ipsos MMI 2013 p. 9-12).

Children whose parents were born in Norway had a significantly better swimming ability than children whose parents were born in Asian or African countries. This was the case in both 2003, 2009 and 2013. Children whose parents are born in Asian or African countries are much more dependent on the schools teaching them how to swim. This is because their parents often do not know how to swim or have issues with their children taking part in swimming courses. The increase in hours spent on swimming education per month seems to have improved the swimming ability among Norwegian children in primary school from 2003 to 2013. All of the studies of swimming ability among Norwegian children in the fifth grade include information on the percentage of children that can swim 200 meters or more. This data is to be found in the studies from 2003, 2009 and 2013. However the Nordic definition of swimming ability is not mentioned.

In 2008 the Norwegian Directorate for Education and Training i.e. Utdanningsdirektoratet published a guidebook for teachers and swimming instructors in the Norwegian primary and secondary schools. The guidebook was called Svømme- og liveredningsopplæring –

Støttmateriell for lærere og instruktører i grunnskolen. It was meant to serve as a guidebook and manual for teaching swimming and lifesaving in the Norwegian primary and secondary schools. The guidebook was made as a cooperation between the NSF, NLS and the NSSS for the Norwegian Directorate for Education and Training. In the guidebook there is a suggestion for a national definition of swimming ability. However it is specifically mentioned that this suggestion is not accepted or adapted by the Norwegian Directorate for Education and Training as a national definition of swimming ability to be used by the primary and secondary schools. The suggestion for a national definition of swimming ability was: roll into deep water, swim 100 m on your stomach, stop and rest (float on your stomach, roll over, float on your back) for 3 minutes in total and finally swim 100 m on your back to the finish (Utdanningsdirektoratet 2008 p. 19)

Ninety-three percent of the Norwegian primary schools arranged swimming education for their pupils in 2013 compared to 99 % in 2009. Most schools concentrated a larger amount of swimming education to the third and fourth grade. Fifty-eight percent of the teachers in 2013 compared to 48 % in 2009 thought that the pupils should be able to swim by the end of fourth grade. The survey question to the teachers did not include a fixed distance e.g. 200 meters. The question asked in the survey was: by which grade should the pupils be able to swim at the latest? (Ipsos MMI 2013 p. 42). The average amount of pupils per group, learning how to swim decreased from 2003 to 2013. In 2003 there were on average 14 pupils per group, 13 in 2009 and only 11 in 2013. Smaller groups enable more effective teaching and a safer learning and teaching environment. (Ipsos MMI 2013 p. 53)

In 2003, 23 % of the schools used trained swimming instructors or external teachers for the swimming education, 17 % in 2009 and only 13 % in 2013. Eighty-two percent of the teachers in 2009 and 2013 wished they had had more time or hours for swimming teaching. Only eight percent of the teachers in 2013 felt that they didn't have sufficient skills to teach swimming. Still 56 % of the teachers in 2009 and 2013 would have taken a course in swimming teaching had one been arranged. The amount of teachers giving swimming lessons that had taken part in a lifesaving course had increased from 96 % in 2003 to 98 % in 2009 and 99 % in 2013. The number of teachers taking lifesaving tests and updating their lifesaving skills more frequently had also increased. (Ipsos MMI 2013 p. 44, 50, 53 & 55)

In 2015 an updated national curriculum concerning swimming teaching in primary school came into force in Norway. A definition of swimming ability was introduced in the curriculum. This was a result of years trying to improve the swimming teaching in the Norwegian schools and thus the swimming ability among Norwegian primary school children. The goal in the updated curriculum was that swimming ability should be reached before the end of fourth grade. (Norsk Lektorlag 2015) According to the definition of swimming ability in the curriculum one can be considered able to swim if: after falling into deep water, one can swim 100 m on the stomach, during the swim dive down and pick up an object using the hands, stop and rest for 3 min (while floating on the stomach, orientate, roll over, float on the back), swim 100 m on the back to the finish and be able to get up on land. (Utdanningsdirektoratet 2015)

The president of the NSF, Per Rune Eknes was pleased that the Norwegian national curriculum finally was in line with other European countries. At the same time Eknes was concerned about the fact that many Norwegian municipalities still arrange too little swimming education, the number of indoor pools is too low and the use of incompetent swimming teachers too common. The Norwegian Union of University Researches and Teachers or Norsk Lektorlag suggested that the Norwegian Ministry of Education or Kunnskapsdepartementet imposes qualification criteria for swimming teachers in school. The argument for this was that swimming teaching with large groups requires proper, sufficient skills. (Norsk Lektorlag 2015)

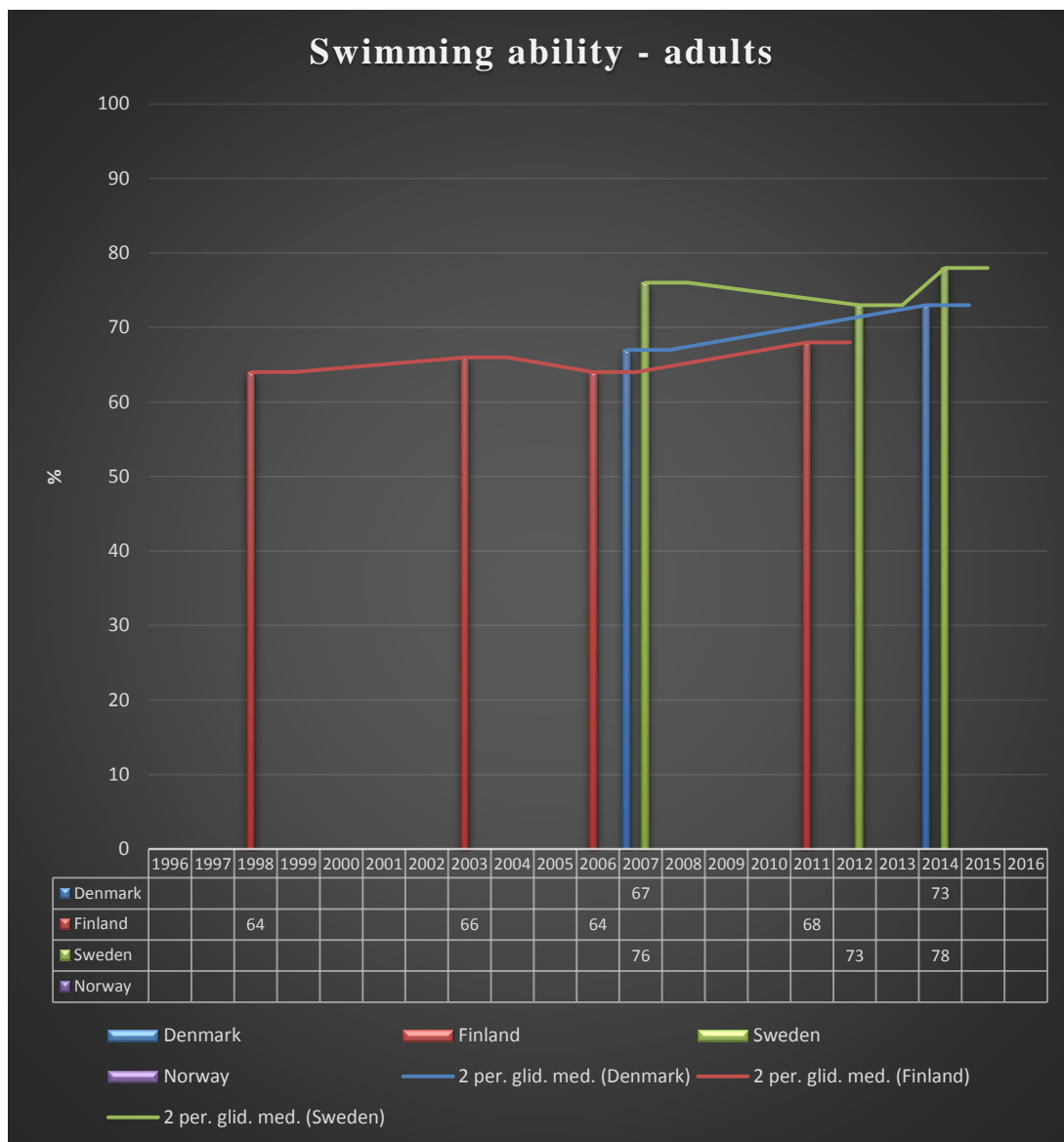


Figure 7. Swimming ability in the Nordic countries 1996-2016 - adults

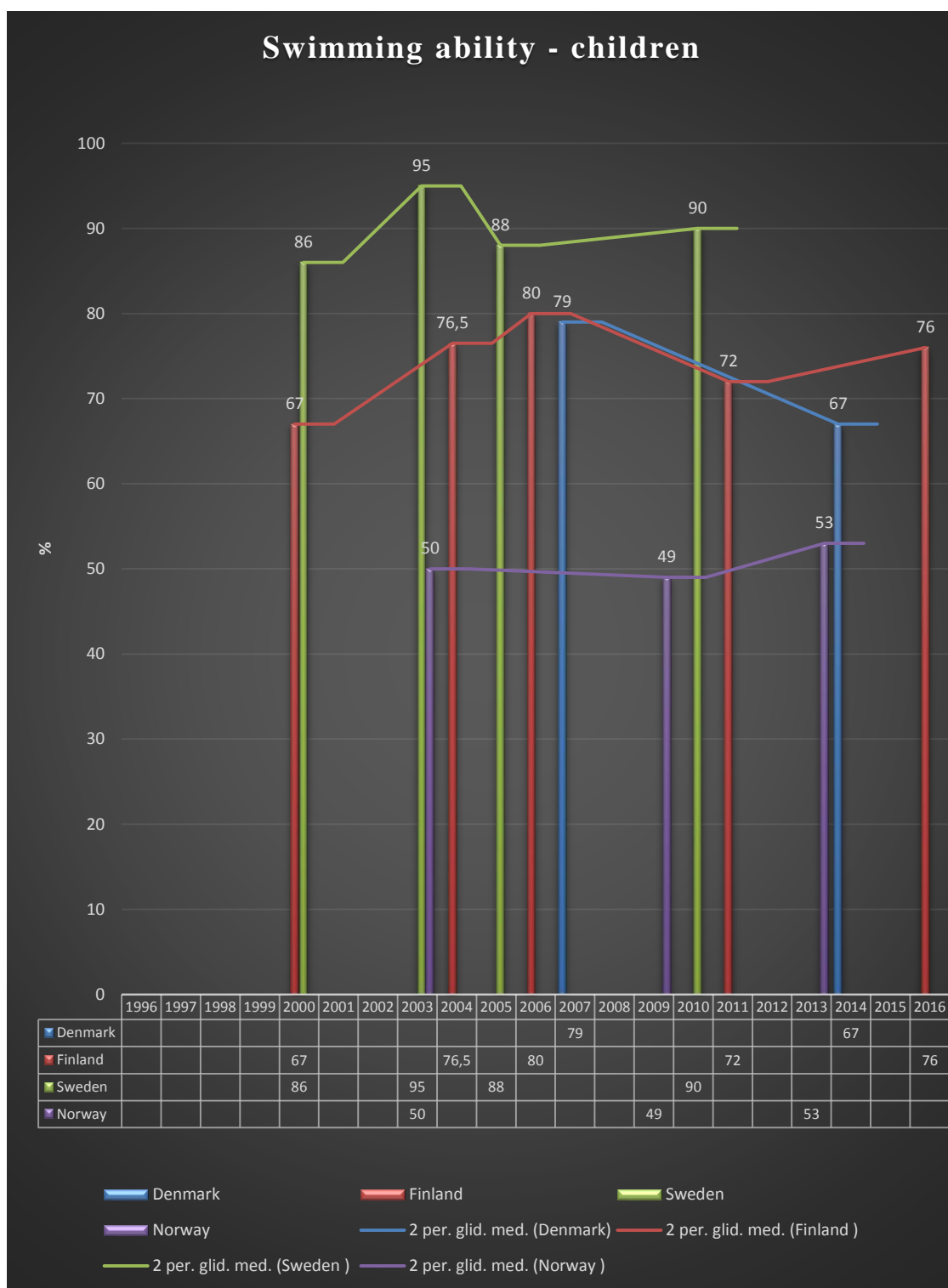


Figure 8. Swimming ability in the Nordic countries 1996-2016 – children

5.7 Collecting Nordic drowning and swimming ability data

5.7.1 Collecting drowning data

Drowning data in the Nordic countries is usually collected in advance from press clippings by the national lifesaving federations during the year. Lifesaving federations do not have access to coronary and police reports and thus these preliminary drowning statistics are not complete. The advance data is later followed by official drowning statistics provided by the national statistics bureaus that have access to all necessary reports. There is often a substantial delay before official drowning statistics are published. This is due to the time-consuming process of investigating a drowning incident. This includes police investigations, reports, autopsies, coronary reports, and so on. This delay explains the need for preliminary drowning data. Preliminary drowning statistics are important for lifesaving organizations because they enable drowning preventive measures based on up to date information. Preliminary data includes information about the incident e.g. age, gender, location. This is usually enough to guide the lifesaving federations in their drowning preventive work. In Sweden the national lifesaving federation SLS has been publishing a yearly report on the drowning statistics both in Swedish and English since the year 2000. In Finland the Finnish Swimming Teaching and Lifesaving Federation has been collecting preliminary drowning statistics since 1999. Since 2011 a yearly report on preliminary drowning statistics has been published in Finnish and English.

In addition to the yearly drowning statistics several long term studies of drowning incidents have been made in the Nordic countries from 1996 to 2016. The long term studies of drowning incidents are very detailed and packed with valuable information for drowning preventive work. Needless to say that the long term drowning studies require substantial resources and a cooperation from several drowning preventive actors.

In Finland the Safety Investigation Authority or Onnettomuustutkintakeskus launched a study to gather information on drowning deaths covering the time period 1.4. 2010- to 31.3.2011. The report was published in 2011 (Turvallisuustutkinta 2011). The Safety Investigation Authority also collected information on accidental deaths among 0-17 year old children during a three year time period from 2009 to 2011 (Turvallisuustutkinta

2012). In Denmark TrygFonden a national authority on safety and protection collects drowning data in cooperation with Statens Institut for Folkesundhed, a national authority on public health and welfare and Syddansk Universitet. A longitudinal research on the drowning statistics for the years 2001-2009 and the development of the drowning rates from 1970-2009 in Denmark has been made. The final report was published in 2011 (Moller et al. 2011). A follow up study to this was made covering the years 2001-2012 and 1970-2012. The results were published in 2014 (Dansk Svømmeunion 2014b).

In Norway drowning statistics are collected by the SSB or Statistisk Sentralbureau i.e. the national statistics bureau, the Norwegian Lifesaving Society or Norges Livredningsselskap and the NFH or Norsk folkehjelp. The Norwegian Lifesaving Society has made a compilation of the drowning statistics for the years 1998-2011 based on data provided by the NFH and the SSB (Norges Livredningsselskap 2015). In Sweden a retrospective study on child drownings (aged 0-17) was made covering the years 1998-2007 by the MSB or Myndigheten för samhällsskydd och beredskap. MSB is a national authority on safety and protection. The final report was published in 2010 (Myndigheten för samhällsskydd och beredskap 2010). MSB and Karlstad University have studied almost 4000 drowning incidents in Sweden covering the years from 1997 to 2011. The final report from this study was published in 2013 (Myndigheten för samhällsskydd och beredskap 2013)

5.7.2 Collecting swimming ability data

The instrument for collecting swimming ability data in the Nordic countries during the past twenty years has been the survey. Usually it has been either a more traditional postal survey or a web-based survey or questionnaire. Sometimes a combination of both. Phone interviews have also been used. Separate surveys have been used for testing adult and child swimming ability. Sometimes the same survey has included separate sections for adults and children. The research questions have been directed to the primary research group i.e. children or adults. Surveys of child swimming ability have often included additional questions to parents or teachers. This has been done to get a wider more comprehensive view of the children's swimming ability. Many of the research surveys have included a practical validation test of swimming ability. Practical validation tests have

sometimes revealed a slightly better, sometimes a slightly worse swimming ability than the survey results have suggested.

Drowning preventive research and thus drowning preventive measures rely on self-estimates of e.g. swimming ability. Research has proven that it is difficult to estimate one's swimming ability correctly. This puts the survey as a research instrument into question. It is important to be critical when considering survey results that are based on self-estimates. Particularly children might have difficulties in estimating their own swimming ability. Adults might base their estimates on skills that were acquired long ago and that do not reflect the current swimming ability. (Moran et al. 2012 p. 122-123 & 132-133) However there must be a research instrument that is reasonably reliable and at the same applicable and implementable on a larger scale. The survey therefore seems to defend its position as the most cost effective research instrument for the time being.

The research reports from the Can you swim? (Moran et al. 2012) and Can you swim in waves? (Kjendlie et al. 2013b) studies offer a different view on defining swimming ability. The studies reveal thoughts and arguments that challenges a more traditional view of swimming ability. Overall the term swimming ability has been under much scrutiny in recent swimming and water safety research. The international research project Can you swim? has discussed the term swimming ability and the difference between real and perceived water competency (Moran et al. 2012). It might come as a surprise to some but there is no universal or globally accepted definition among water safety experts what swimming competency actually is. There have been suggestions that the term swimming ability should be either replaced completely by, or included in the term water competency. There seems to be a mutual understanding among water safety experts that further work is needed to define what being able to swim actually means. Even if there is a correlation between real and perceived water competency, the correlation is weak. (Moran et al. 2012 p. 122-123 & 132-133)

6 DISCUSSION

In the final chapter of this thesis the results presented in the previous chapter will be summarized and discussed in a critical and analytical way. Conclusions will be drawn

based on the theoretical framework and corner stones for this thesis i.e. the ILS and WHO drowning prevention documents, Nordic swimming ability surveys, drowning statistics and other significant documents. The research questions and the hypotheses will be answered. Finally a critical review of the thesis as a whole will be made and potential flaws and shortcomings discussed. Unanswered questions and potentially interesting, future research topics will also be revealed.

6.1 Swimming ability and drowning prevention

This thesis is called Swimming ability and drowning prevention – do they have something in common? A Nordic case study. The time has come to discuss the research questions presented in chapter three.

6.1.1 Nordic swimming ability and drowning rates 1996-2016

The first research question I wanted to answer was:

- 1) How has swimming ability and drowning rates developed in the Nordic countries during the last twenty years?

There has been a fairly rapid and continuous decline in the drowning rates approximately since the middle of the 20th century when swimming education was introduced on larger scale in the Nordic countries. In 1996 the Nordic definition of swimming ability was accepted and agreed upon by the Nordic lifesaving federations. The Nordic definition of swimming ability has been used as a benchmark in swimming education and swimming ability research in the Nordic countries since then. The swimming ability among Nordic children is good in a global perspective. The swimming ability among Swedish children has been 85-95 % during the 21st century. The swimming ability among Finnish children has been between 67 and 80 % during the 21st century. The swimming ability among Norwegian children has slowly been improving from 42 % in 2003 to 53 % in 2013. Even though the trend is positive 53 % is a low number compared to other Nordic countries. A partial explanation might be the different approach to the definition of swimming ability

adapted in Norway. Denmark is the only Nordic country where children's swimming ability has declined during the 21st century from 79 % in 2007 to 67 % in 2014. Very few children drown in the Nordic countries per year. The amount of fatal, accidental child drownings is usually under 10 per year and declining. Preventing child drownings has been one of the most important drowning preventive issues in the Nordic countries during the last twenty years.

Adult swimming ability in the Nordic countries is worse than children's swimming ability in general. There is a big difference in the swimming ability of younger and older generations. Adult swimming ability in Sweden has increased from 76 % in 2007 to 78 % in 2014. In Finland adult swimming ability is slightly lower with 64 % in 1998, 66 % in 2003, 64 % in 2006 and 68 % in 2011. In Denmark the swimming ability of adults has improved from 67 % in 2007 to 72 % in 2014. There is no systematic research of adult swimming ability in Norway from the last twenty years to be found. Adult swimming ability in the Nordic countries has slowly but steadily been improving. During the last twenty years the positive development of declining drowning rates that began during the 20th century has continued but at a slightly slower pace than during mid- to late 20th century.

It is quite understandable that significant efforts are made to improve children's swimming ability and prevent child drownings. If a child drowns the emotional, economic and social costs are very high over time. Drowning preventive work to prevent child drownings in the Nordic countries has focused on primary and secondary drowning preventive measures as described by the ILS. Primary drowning preventive measures are e.g. mandatory fencing for pools, ponds, ditches, protecting those at risk e.g. promotion of survival swimming for primary school children, increased access to learn to swim programs and training of water safety skills and increased awareness of the importance of constant supervision of children. Secondary drowning preventive measures are e.g. providing emergency and rescue equipment, swimming with others, swimming and lifesaving education and CPR education to the general public. (International Life Saving Federation 2015 p. 15-16) Nordic drowning preventive work to prevent child drownings also reflect the WHO:s ten drowning preventive actions, particularly the community based level where

drowning preventive measures include: installing barriers and controlling access to water, providing safe places away from water to preschool children with capable child care, teaching school children basic swimming, water safety and safe rescue skills, training bystanders in safe rescue and resuscitation, strengthening public awareness and highlighting the vulnerability of children. The WHO:s ten drowning preventive actions also work through effective policies and legislation. This can mean e.g. coordinating drowning prevention efforts with other sectors and agendas, developing a national water safety plan and addressing priority research questions with well-designed studies. (World Health Organization 2014 p. 18-19)

Legislation and policies play an important part in Nordic drowning preventive work to decrease child drownings. A good example are the national curriculums for primary and secondary school. All Nordic countries have mandatory swimming education in their curriculums today. This is a great victory for drowning preventive work in the Scandinavia. The Nordic lifesaving federations have been campaigning for this and helping national authorities develop the curriculums in a drowning preventive direction. There have been many additions and improvements to the curriculums over the years. There has been a lot of debate of whether the curriculums are demanding or specific enough concerning the swimming education. This work continues to this day. Almost all children in the Nordic countries can be reached through the school system. Primary school is for many Nordic children the best place to learn how to swim. In addition to this many children learn to swim in swim clubs or with their parents. The Nordic model of teaching swimming and self-rescue skills to primary and secondary school children is a true success story.

Children´s swimming ability still seems to be improving and the drowning rates declining. But what about the adults? Should we be satisfied with the efforts made to improve adult swimming ability and with the level of adult swimming ability in the Nordic countries today? Looking at the drowning statistics it is evident that middle aged and older people are at a much higher risk of drowning than younger people. Middle aged and older men make up a very large part of the Nordic drowning statistics. This is a group of people who´s swimming ability is very hard to improve by planning and designing swimming education. Swim clubs and swim courses for adults are increasing but the vast majority of the people and particularly men might be hard to reach through swimming education. Therefore the methods to prevent adult drownings in the Nordic countries have focused

on primary and secondary drowning preventive measures and actions targeted at the general public and men in particular. These include education and legislation against the consumption of alcohol when boating, fishing, swimming etc., increased education in boating safety regulations and the use of PFDs. Secondary drowning preventive measures targeted at this group are e.g. onboard communication equipment on boats and other vessels enabling calling for help, providing emergency and rescue equipment, swimming with others, swimming and lifesaving education and CPR education to the general public. (International Life Saving Federation 2015 p. 15-16)

Tertiary drowning preventive measures are also important as adults constitute such a large part of the Nordic drowning statistics. Tertiary drowning preventive measures try to minimize the negative impact of a drowning incident through proactive intervention and by reducing the risk of death and injury. Tertiary measures aim at improving the level of aftercare once a rescue has been made e.g. the level of first aid, finding the proper care according to the severity of the incident. (International Life Saving Federation 2015 p. 16) Time is a crucial factor when treating a drowning victim. A fast rescue must be followed by fast resuscitation to minimize brain damage and other tissue damage due to lack of oxygen. Hospital care of drowning victims is complex, time consuming and expensive. Therefore preventive measures are key and if a near drowning incident occurs, a fast rescue followed by proper treatment. The WHO:s ten drowning preventive actions on a community based level include: water safety and safe rescue skills, training bystanders in safe rescue and resuscitation, strengthening public awareness. Effective drowning preventive actions through policies, guidelines and legislation are: setting and enforcing safe boating, shipping and ferry regulations. (World Health Organization 2014 p. 18-19)

6.1.2 Data collection instruments and data quality

The second research question I wanted to answer was:

- 2) How has swimming ability and drowning data been collected in the Nordic countries during the past twenty years?

The most common instrument for collecting swimming ability data in the Nordic countries during the past twenty years has been the survey. The survey results are based on

subjective perceptions of swimming ability. In other words the research subject has to be able to correctly estimate his or hers swimming ability. There has been much debate about the survey as an instrument for testing swimming ability. The research survey is a reasonably cheap, fast and reliable method to gather data about a large group of people. However it has been proven difficult to accurately do self-estimates of one's swimming ability. Particularly men tend to overestimate their own swimming ability. This is a concern from a drowning preventive perspective. Swimming ability testing through surveys gives valuable information for planning swimming education as a drowning preventive measure. Therefore it is also important that the results reflect reality. A legitimate concern is that the understanding of the importance of swimming ability as a drowning preventive measure or action is based on speculations. In other words drowning preventive research relies on self-estimates of swimming ability which are notoriously difficult to correctly assess. However the people who defend the survey as a research instrument say that there has to be an economically viable, applicable, implementable instrument to accurately measure swimming ability. The survey seems to have kept its position as the primary instrument for measuring swimming ability in the Nordic countries with reasonably accurate results.

The challenges with collecting reliable, complete and comprehensive drowning data has been described in chapter two of this thesis (see above p.15-18). Data quality is the degree to which the drowning data can be considered reliable or trusted. Indicators on data quality are the strength of the collecting methods, the source of data and consistency with other reports. (International Life Saving Federation 2012 p. 16) In my opinion Nordic drowning data is of a high quality. The actors involved in collecting drowning data are experts in their field of work. Many collectors allows for the collection and validation of data from multiple sources. The sources used for collecting drowning data in the Nordic countries are in most cases national health and safety or security authorities. Reports from different authorities are combined and summarized by the national statistics bureau or the national lifesaving federation. This way a high consistency and level of work is guaranteed. Many collectors also give a better completeness of data on both national and regional level compared to countries that only use one source for collecting drowning data. Downsides with having many collectors are issues with consistency of coding and the quality of data. One data source with consistent coding usually means consistent data over time

that can be combined and compared to increase validation. However the benefits of having many drowning data collectors in the Nordic countries in my opinion outweighs the possible disadvantages.

Data completeness is the degree to which the data covers all drowning deaths and provides enough information on specific sections. Indicators on data completeness are that it covers all key age groups, provides data for both genders and enables both national and regional analyses. (International Life Saving Federation 2012 p. 16-17) It is very important to collect information about the age of the drowning victim as well as information about gender. Many countries do not use proper age groups for adults in their drowning statistics. This might reflect a clear focus on child drownings. The Nordic countries and their drowning preventive actors have taken a zero tolerance to child drownings. At the same time however the official drowning statistics include proper age groups for adults. Preliminary drowning data does not usually include age groups. Preliminary data reveals how the incident happened e.g. swimming, fishing or boating, often during what month of the year and sometimes comparisons are available to the previous year. There is very good, complete information available on age groups and gender in the Nordic statistics.

Data comprehensiveness is the degree to which data can be analyzed against key variables and used for making decisions on preventive measures. Indicators on data comprehensiveness is data that provides information on location of the drowning incident, data on activity prior to the incident, data on other variables or risk factors such as influence of alcohol, drugs, pool fences and the use of lifejackets etc. (International Life Saving Federation 2012 p. 16-17) Nordic drowning data in general provides good information for the drowning preventive actors to work with. Information about the location of the drowning incident is available in the official drowning statistics. Data on activity prior to the incident is also available. Data on risk factors like the use of alcohol and not wearing lifejackets etc. is also reported. Nordic drowning data is in other words comprehensive. It gives detailed information as a base for drowning preventive measures. The Nordic countries use similar but still varying categories for coding drowning incidents and the variables surrounding the incident. This does not mean that the drowning data is any less exact or worse from country to country.

All Nordic countries have high quality, complete and comprehensive drowning data. The amount of categories and the words used to describe the categories for coding drowning incidents are different. The long term studies of drowning incidents in the Nordic countries have provided very detailed data that goes deeper into the underlying causes of the incidents than the yearly, official drowning statistics can. Preliminary drowning data, official, yearly drowning statistics combined with long term studies are close to an ideal system for gathering high quality, complete and comprehensive drowning data. The problem with consistent coding of drowning incidents is relatively small in Scandinavia in a global perspective. The Nordic countries share many similarities concerning climate, geography, customs and practices. However there are also obvious differences e.g. the number of lakes, coastline (Atlantic Ocean/Baltic Sea/Arctic Ocean) and so on. There is bound to be some differences in the coding of drowning incidents between the Nordic countries. The Nordic drowning preventive cooperation might gain from looking over drowning research made during the last few decades to learn from one another and unify the most important categories for coding location, activity prior to the incident and risk factors. This could offer a better way to compare drowning data, drowning incidents between the Nordic countries directing the drowning preventive work and saving valuable, limited resources. Drowning preventive work in the Nordic countries has clearly focused on decreasing the amount of fatal, unintentional or accidental drownings.

6.1.3 An improved swimming ability implies fewer drownings

The third research question I wanted to answer was:

- 3) Has there been an improvement in swimming ability followed by a decrease in the amount of fatal, unintentional drowning incidents in the Nordic countries during the last twenty years?

The development of the swimming education in the Nordic countries has been fruitful particularly within the school system. The Nordic definition of swimming ability seems to have had a positive effect on swimming ability particularly among children during the last twenty years. Younger generations in the Nordic countries are significantly better swimmers than older generations. Swimming ability statistics from the past twenty years

reveal that age, gender, living area, level of income and education are factors that affect the swimming ability of a person. The older the person the worse the swimming ability in general. The older generations have not received the same amount or perhaps any swimming education in school. For example in Finland the swimming ability among people aged 55-64 years was approximately 50 % in all studies between 1998 and 2011. This is almost certainly a partial reason to why middle aged and older men are so overrepresented in the Nordic drowning statistics. In addition research has shown us that men tend to overestimate their swimming ability and underestimate potential water hazards. Nordic men are slightly better swimmers than Nordic women. However male risk taking behavior and the overestimation of swimming ability put men at a higher risk of drowning. The swimming ability of the Nordic people is slowly but steadily rising. At the same time the drowning rates are continuing their slow but steady decline. The last twenty years has been no exception to this positive development. Warm summers cause peaks in the Nordic drowning statistics and can increase the annual, fatal drownings by over 30 incidents.

6.1.4 Swimming ability and drowning rates correlate

The fourth and last research questions I wanted to answer was:

- 4) Is there a correlation between an improving swimming ability and declining drowning rates?

Everything points to the fact that by increasing the amount of swimming education you can improve the swimming ability of a population and reduce the number of fatal, unintentional drowning incidents over time. The swimming ability surveys I have studied during the course of this thesis have proven that by increasing the amount of swimming education in school you can improve the swimming ability of the school children. By decreasing the amount of swimming education you decrease the swimming ability. Even though the Nordic definition of swimming ability can be discussed as a guidance tool for swimming education and a benchmark for testing swimming ability, it has without a doubt given in particular the Nordic children a better swimming ability. On average under 10 children drown in a Nordic country per year. When times are tough and resources for education scarce, the amount of swimming education seems to decline. It does not take

long before this translates to a worsened swimming ability among the school children. The Nordic curriculums that steer the swimming education in school have been improved a lot over the years. This has been a cooperation between governmental authorities and swimming education and lifesaving experts. It is important to make sure that swimming education gets the attention and the resources it deserves. More indoor pools need to be built and teachers need to have the sufficient skills to teach children vital water competency skills. Swimming education should start early during the first years of primary school and continue throughout primary and secondary school. More attention needs to be brought to the fact that swimming ability and other aquatic skills need to be practiced regularly throughout life.

The vast majority of the fatal, unintentional drowning incidents in the Nordic countries involve a middle aged or older man. The typical Nordic drowning incident occurs while swimming, fishing or boating close to shore. Many times the victim is under the influence of alcohol and is not wearing a lifejacket. If the incident occurs while boating, the boat is often a small, recreational boat e.g. a rowing boat or a small motor boat. The victim often stumbles or falls into the water. Under 10 % of the fatal, unintentional drowning incidents are due to falling through ice. In this cocktail of carelessness it is hard to define a correlation between improvements in swimming ability and declining drowning rates. No amount of swimming ability can save you from drowning if the other risk factors are too high or too many. However other drowning risk factors e.g. age, gender, alcohol and not wearing a personal floatation device do not decrease the importance of swimming ability. Swimming ability has an important drowning preventive role. Even though adults are hard to reach through swimming education the message has to be to train aquatic skills regularly throughout life and to be aware of one's swimming and self-rescue abilities.

6.2 Thesis evaluation

This is the last section of this thesis. It is time to evaluate the thesis as a whole and to point out possible shortcomings and challenges that I have faced along the way. Finally I will discuss unanswered questions and what might be valuable or interesting for future research in this field.

6.2.1 Collecting material

Perhaps the biggest, initial challenge for me was to create a network of people who could help me find research material from all the Nordic countries from the last twenty years. I had no delusions about the amount of work I was facing. Swimming ability and drowning research is plentiful. However it is not easy to find. This is particularly true for swimming ability research. I was very lucky to have a supervisor at Arcada - University of Applied Sciences who could help me find valuable contacts in the other Nordic countries. To say to the least it was a challenge to find, read and summarize every swimming ability research in the Nordic countries from the past twenty years. The drowning statistics was no easier task. The ILS and WHO gather global drowning statistics and publish official drowning rates. However they are challenging to interpret and compare since the methods for calculating and estimating the drowning rates differ. Even though the ILS and WHO drowning rates are indicative you have to be careful in drawing too far-reaching conclusion based on them. The official drowning rates gives us an indication of what the reality is. In addition to them I had to look at drowning statistics from every Nordic country as far back as I could. I had to establish a long term trend as well as a more recent trend from the past twenty years. The Nordic countries have gathered drowning data with varying methods and frequency. It was a challenge but I believe I managed to find important trends and similarities in the drowning statistics of the Nordic countries. I have been able to find a vast amount of material. There is of course the chance that I might have missed something of relevance. However I do believe that this thesis can provide at least a good starting point for researching Nordic swimming ability and drowning incidents in the future.

6.2.2 Drawing conclusions

The amount of research material I ended up with was very large and it led to difficulties in choosing relevant information and summarizing the material. I do believe that I also included material in this thesis that was not completely relevant for answering my research questions. On the other hand a thesis covering four Nordic countries is bound to be extensive and you are bound to have challenges with choosing relevant material. I believe I managed to answer my research questions to a satisfying degree. I managed to paint a picture of the development of the swimming ability and the drowning rates in the

Nordic countries from the past twenty years. I am now certain that improvements in swimming ability lead to declining drowning rates. Thanks to a consistent development of the swimming education the drowning rates are historically low in the Nordic countries. This positive development seems to continue but it requires continued work and more swimming education, not less. The other drowning risk factors like e.g. alcohol and not wearing personal floatation devices tend to take center stage when it comes to drowning preventive work in the Nordic countries. A mandatory use of lifejackets could be the single most effective drowning preventive measure but the role of swimming ability should in my humble opinion receive more attention. We can do a lot by further improving the swimming ability of the Nordic people. This requires an even closer Nordic cooperation and open minds.

6.2.3 Future research

The Nordic countries need to work together in further developing their swimming education and drowning preventive work. The debate surrounding the Nordic definition of swimming ability must be turned to something positive. I believe there is still room for improvements within the Nordic definition. That being said the Nordic definition of swimming ability has served the Nordic countries well for twenty years and created wonderful results in form of improved swimming ability and declining drowning rates. The rest of the world is having difficulties in defining swimming ability and self-rescue skills. There is to this day no globally accepted definition of swimming ability. This is where the unique cooperation between the Nordic countries really can make a difference and act as a role model on a worldwide scale. I am keen to see how the Nordic definition of swimming ability will develop in the future. Researching this and the opinions surrounding the debate could be an interesting research topic for the future. There seems to be a vast amount of knowledge of swimming education and lifesaving in the Nordic countries. The results speak for themselves. I believe there is still a lot to be done and many lives to be saved through a Nordic swimming education and lifesaving cooperation.

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SWEDISH SUMMARY / SVENSKSPRÅKIGT SAMMANDRAG

Det här examensarbetet är en longitudinell undersökning av simkunnighetens och drunkningsstatistikens utveckling i de nordiska länderna från 1996 till 2016. Arbetet behandlar utvecklingen i Finland, Sverige, Danmark och Norge. Materialet utgörs huvudsakligen av simkunnighetsundersökningar och drunkningsstatistik från respektive länder. Därtill har vetenskapliga artiklar om simkunnighet och drunkningsprevention styrkt materialet. Den teoretiska grunden vilar på världsomfattande dokument från det drunkningspreventiva arbetets område. Av dessa kan nämnas WHO:s - Global Report on Drowning från 2014 och International Life Saving Federations - Drowning Prevention Strategies från 2015. Min avsikt har varit att kunna påvisa ett samband mellan en förbättrad simkunnighet följt av en nedgång i det årliga antalet fatala drunkningsolyckor i de undersökta länderna. Utgångspunkten är året 1996 då de nordiska livräddningsföreningarna kom överens om en samnordisk definition av simkunnighet. Enligt den nordiska definitionen på simkunnighet kan en person anses vara simkunnig om: ”han/hon efter att ha hamnat i vattnet kan simma 200 meter varav 50 meter på rygg”. Året 1996 var alltså startskottet på en mera systematisk forskning av den nordiska simkunnigheten med grund i den nordiska definitionen på simkunnighet.

Det är sedan länge känt att flera faktorer påverkar risken för att råka ut för en fatal, drunkningsolycka. Av dessa kan nämnas ålder, kön, etniskt ursprung, sjukdom och andra faktorer. Bland de andra faktorerna finner vi bruk av alkohol då man simmar, fiskar eller åker båt, försummelse att använda flytväst på sjön samt simkunnighet. En nations simkunnighet ser ut att spela en tydlig drunkningspreventiv roll. En förbättrad simkunnighet ser ut att leda till ett lägre antal årliga drunkningsolyckor med dödlig utgång. Resultaten i detta arbete styrker detta påstående. De undersökta ländernas simkunnighet har ökat och antalen årliga, fatala drunkningsolyckor minskat under den undersökta tidsperioden. I de nordiska drunkningsolyckorna är alkoholen ofta en bidragande orsak. Alkohol brukas ofta i samband med både simmande, fiskande och båtliv. Därtill syns försummelse att använda flytväst på sjön tydligt i den nordiska drunkningsstatistiken. Män är starkt överrepresenterade i drunkningsstatistiken i alla åldersgrupper i alla nordiska länder. Detta minskar trots allt inte simkunnighetens roll i och betydelse för det drunkningspreventiva arbetet.

Ett viktigt instrument för att förbättra simkunnigheten i Norden har varit grundskolornas simundervisning och således grundskolornas läroplaner. De nationella läroplanerna i alla nordiska länder innehåller idag ämnet simundervisning. Simundervisningen är en del av gymnastikundervisningen i skolorna. De nordiska simundervisning- och livräddningsförbunden har i samråd med de nationella undervisningsmyndigheterna sakta men säkert förbättrat läroplanernas innehåll beträffande simundervisningen. En tillräckligt exakt läroplan är viktig med tanke på simundervisningens kvantitet och kvalitet. Det har visat sig att simundervisningen i Norden lider under ekonomiskt utmanande tider. Därför är det viktigt att de nationella läroplanerna i tillräcklig mån förpliktar de lokala nordiska skolorna i arrangerandet av simundervisningen. Grundskolan har en betydande roll i att lära ut simkunnighet i de nordiska länderna. Med tanke på en människas simkunnighet är det viktigt att inläringen av simkunnighet börjar så tidigt som möjligt. De nordiska skolorna har beaktat detta och i de flesta fall börjar simundervisningen under de första åren i grundskolan. Simkunnigheten måste upprätthållas genom regelbunden träning livet ut.

Tyvärr finns det relativt stora skillnader mellan yngre och äldre generationers simkunnighet i de nordiska länderna. Yngre generationer som i större mån fått simundervisning i skolan är klart skickligare simmare än äldre generationer. Äldre generationer har antingen inte fått någon simundervisning alls, betydligt mindre undervisning eller simundervisning av sämre kvalitet. Detta har också delvis påverkat det faktum att medelålders och äldre människor är klart överrepresenterade i den nordiska drunkningsstatistiken. De nordiska samarbetet inom drunkningsprevention är unikt och har skapat fantastiska resultat. Den Nordiska definitionen av simkunnighet från 1996 som har varit en hörnsten i detta arbete har haft en betydande roll i att öka simkunnigheten i de Nordiska länderna. Då det fortfarande saknas en globalt accepterad definition av simkunnighet och livräddningsfärdigheter kan det Nordiska samarbetet utgöra en utmärkt modell för resten av världen.

